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ERRATA

Contents,	last	Chapter	should	be	Chapter VII
Pp. 3 & 5, lines 10 & 18,	read	*homogeneous*	for	homogenous	
P. 4, line 11 from below,	,,	*independently*	,,	indepedently	
P. 5, last line,	,,	*primitive*	,,	primitve	
P. 28, 3rd. para, last line,	,,	*determination*	,,	deterioration	
P. 31, line 15 from below,	,,	*Orrissa*	,,	Madhya Pradesh	
P. 37, line 10	,,	*was*	,,	were	
P. 40, line 11 from below,	,,	*large parts*	,,	a large part	
P. 42, last line	omit.	*the first molar*			
P. 118, line 14	read	*works*	,,	work	

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Introduction

The chief aim of this book is an attempt to assess the ethnic position of the aboriginal tribes of this country. They are the autochthones of this land. Earlier anthropologists have sought to bring them from outside this country, because they held, that this sub-continent was at one time a vacuum and played no part in the evolution of races. To them I would refer to Chapter II (Part I) of this book by Sir Arthur Keith. It appears to the present writer that a similar biological approach to the question of races in India has never been before put forward by any one else. It is unfortunate that within the last twenty years no investigation on these lines has been made in this country. The primary idea of reprinting Sir Arthur's review is to trace out further lines of work even at this late hour.

The book has been divided into two parts. The first part comprises two chapters, one from Professor Eugen Fischer, which has been rendered into English from the original German by the present writer and the other by Sir Arthur Keith, mentioned above. It appears to the present author, that these two chapters are a prelude to the understanding not only of the second part of the book but also of the complicated phenomenon of the inter-relationship of the human races in India. Professor Fischer's chapter will elucidate the position of the Vedda in a mutational background. It will also be seen in this context how inept the term Proto-Australoid is. We have discussed this further elsewhere in this book.

The question of the modern races in India cannot be solved before that of the aboriginal races is settled. The latter question is not as complicated as the former, and above all the cultural heritage of the modern races of India is no less influenced by the aborigines themselves. That may be one of the reasons why the aborigines have not so far been treated as a separate entity. Whether it would help us in the elucidation of the question of races in India, is too premature to say, but the task is nevertheless worthy of attempt from the standpoint of evolution and racial origins. I do not claim to have done this with any degree of thoroughness in this book. Nothing is known of the pre-Veddid stage. The human remains discovered in the Indus Valley and other archaeological sites might have

given some clue ; but nobody knows, how many years, after the already past 25 years, will elapse before their detailed studies are published. Sir Mortimer Wheeler's supplementary volume of the Cambridge History of India is definitely poor without a discussion of the Indus Valley human remains, just as was the case with the Harappa Excavation Report published without it about 15 years ago. Indian Anthropology has mainly confined itself, so far, on problems of *racial affinities* and in view of that alone, detailed studies of the pre-historic human remains appear to be the primary desiderata. It has remained a serious gap in our knowledge and it appears to be due to our unpardonable neglect.

Risley gave Indian Anthropology a methodological start. Social or cultural anthropology has been popular long since the travellers, missionaries or administrators came in contact with the primitive peoples but physical anthropology in this country is indebted to Risley for his scientific beginning. There are no doubt a few anthropometric series from the army surgeons but they have not been so methodically utilised as those of Risley.

Till the other day Risley has been the subject of vehement criticism. It began with the publication of Ramaprasad Chanda's *The Indo-Aryan Races*[1] and has been continuing for the last 38 years. What have we added to our knowledge by these criticisms ? Have we solved the problem of racial affinities of the Bengalis ? Could we add any more basic data to those already collected by Risley ? Risley has been criticised for his faulty technique of anthropometric measurements but there is no solid ground to reject them. It is gratifying to note that Sengupta[2] (1953) has very ably pointed it out. Risley followed Topinard's system of measurements and while there has been no criticism of Topinard's methodology, Risley has been most mercilessly criticised for no fault of his own. None except Mahalanobis[3] has taken up the cause for Risley's anthropometric data. In two detailed studies (1933-34) he has shown

1. Chanda, Ramaprasad, 1916. The Indo Aryan Races, Rajshahi.
2. Sengupta Sailendranath, 1953. The Racial Composition of the Bengalees in *The Tribes and Castes of West Bengal* 1951.
3. Mahalanobis, P.C. 1933-34, A Revision of Risley's Anthropometric data relating to the Tribes and Castes of Bengal, *and* A Revision of Risley's Anthropometric data relating to the Chittagong Hill Tribes, *Sankhya,* 1, pp. 76 & 267.

the very few arithmetic mistakes which crept in Risley's original data and corrected them, so that they can safely be used by anthropologists. Mahalanobis, Rao and Majumdar[4] (1949) have pointed out that the Brahman and Kayastha samples of 1931 Census are not wholly from Bengal—a number of them was from Ahmedabad. It is unfortunate that the 150 individuals, measured from these two castes in the 1931 Census, could not be gathered from Bengal. Risley's data do not suffer from such incongruities and yet his data have been recommended for rejection.

Dudley Buxton pointed out long ago that Risley has been criticised on the issue of nomenclature only. Sir Arthur Keith, as will be evident from his review (Chapter II), has tried to explain the probable meaning of the term 'Mongolo-Dravidian'. Whatever be the meaning, Risley was working before the re-discovery of the Mendelian laws and we have changed or rejected many of our ideas based on pre-Mendelian concepts. This would have been enough to put a stop to Risley's nomenclatures and much good work could have been done on the very valuable basic data published by him. A significant observation has recently been made by Sarkar, Das and Agarwal[5] (1953) from Risley's data. They found by comparing modern data with those of Risley that brachycephaly has been increasing among all the castes of Bengal. The above authors did not take this as a point of their enquiry since their problem was concerned with the Anglo-Indians of Calcutta ; the above fact came out of itself in the course of working up the comparative data. Herein lies the value of Risley's data ; they have never been worked out from the morphological and comparative standpoint.

Much has been written on the Negrito racial strain in India since Guha's re-opening the issue in 1927. It matters little if we possess certain amount of Negrito blood in us ; but for the sake of truth and in order to keep it "inviolate and uncorrupted" there should have been an expedition among the Kadars of South India, rather than accept the few indistinct photographs of head hair alone, as evidence of the controversial Negrito strain. And here is the most recent pronouncement of an authority like Paul

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4. Mahalanobis, P.C., Rao, C.R. and Majumdar, D.N. 1949. Anthropometric Survey of the United Provinces, 1941, *Sankhya,* 9.

5. Sarkar, S.S., Das, B. and Agarwal, K.K. 1953. The Anglo-Indians of Calcutta, *Man in India,* 33, 93.

Schebesta[6] (1952), who has spent nearly all his life among the Negritos :

"Man tut aber gut, eingehendere Untersuchungen abzuwarten, ehe Man Guhas und Huttons meinung zustimmt" (It will be good to wait for intensive researches before we can agree to the opinions of Guha and Hutton.)

The author is fully aware of the shortcomings of this book. The reader will not find here all the aboriginal tribes of India and for that the author alone is not responsible. In India, the basic works like a list of the aboriginal tribes, their accurate census, their geographical distribution, anthropometric or ethnographic surveys, etc., have not yet been done and these are only possible at Government level. In the absence of such basic works, one might say, that a book on the aboriginal races should not have been attempted. To them my answer is, that in the absence of any thorough study and with the presence of dangerous little knowledge, many misconceptions and vagaries have already crept in Indian Anthropology ; and if this small publication can help removing some of these misconceptions at least, it would serve its purpose.

My thanks are first of all due to my most revered teacher Professor Eugen Fischer, who has all through my acquaintances with him, ungrudgingly helped me in reforming my scientific knowledge and career. He has put me into special gratitude by allowing me to publish an English translation of his valuable paper as the first chapter of this book. For this thanks are also due to the Editor, *Comitato Italiano par lo Studio dei Problemi della Popolazione*, Rome, where Professor Fischer's paper was originally published in German. He has, later on, informed me that the abbreviation "Cr" in the accompanying six figures of his paper, stands for Cro-Magnon race.

To Sir Arthur Keith I am grateful for his kind advice and encouragement during the writing of this book and also for his kind permission to reprint his valuable review as Chapter II of this book. For the latter, grateful acknowledgments are also due to the Hon. Editor of *Man*.

The first part of Chapter III and almost the whole of Chapter IV were published in *Man in India*, Vol. 33 and thanks are due to the Editors of the above journal for allowing me to use them here.

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6. Schebesta, Paul, 1952. Die Negrito Asiens, Bd. 1. Wien,

The latter part of Chapter III, dealing with the skeletal remains of the Mālé was originally published in the *Transactions of the Bose Research Institute,* Vols. X and XIV and thanks are due to the Director of the above Institute for allowing me to reprint them here. I am also grateful to him for kindly allowing me to use the blocks in connection with the above.

Thanks are also due to Dr. R. L. Spittel of the Vedda Welfare Board, Colombo, for his kindly lending me the two Vedda photographs (Pls. I and III) for publication here.

The entire book has been my own labour, right from the typing of the manuscripts to the looking up of the press work and whatever short-comings this book possesses, are entirely due to me. There are, however, a few unforgettable associates of this book. They are Messrs Amiya Chandra Chakrabarty, Himansu Kumar Basu, Ajit Kumar Mukerji, Birendra Nath Majumdar, Gautam Sankar Ray, Dr. Dhirendra Nath Ganguli and Prof. Nirmal Kumar Bose. To all of them I am grateful in various ways. The publication of this book would not have been possible without the assistance and encouragement of Mr. Janaki Nath Basu, M.A. of Messrs Bookland Ltd., Calcutta. To him I owe a deep sense of gratitude.

Moydah,
W. Bengal,
December, 1953.

S. S. Sarkar

PART I

CHAPTER I

THE INTER-RELATIONSHIP OF THE HUMAN RACES ON THE BASIS OF MENDELIAN CHARACTERS*

BY

PROF. EUGEN FISCHER

The vast number of researches for the purpose of systematic classification of human races shows the greatest difficulty of the problem. I do not like to go into the details of the system heitherto existing—the older ones of Linnaeus, Blumenbach or the newer ones of Fritsch and Stratz, of Deniker, of Sergi, Giuffrida-Ruggeri, Montandan, etc. All followed the basic rule of using a single or two characters as the principle of classification. Accordingly all human groups with woolly hair or wavy hair or straight hair were grouped together into one group, which were thought to be genealogically unitary and homogenous. The strongest supporting evidence of the standpoint of the genealogical unity of all human forms, will at present, possibly, be the differentiation in the growth of the pygmies themselves (P. Schmidt and others).

The whole question of the relation between the individual racial systems of man gets a somewhat another aspect when we conceive of the racial differences as mendelian characters. The researches on human heredity during the last twenty years have given us the authority to say so. Since Davenport's proof of mendelian heredity in eye colour (1908) and my researches among the South West African hybrids, (1908-13) it has been proved that quite an overwhelming majority of the so-called racial characters and their relationship to definite hereditary factors are mendelian in nature. We must also think that all these characters originate basically through the same mutation process as we describe and analyse in our animal breeds. I have tried to present a digest of the results (1929). There is no ground for discussion, nor even the slightest doubt, that

*Being an English rendering of "Die gegenseitige Stellung der Menschenrassen auf Grund der mendelnden Merkmale", (*Commitato Italiano per lo Studio dei Problemi della Poplazione*, Roma, 1932).

the hereditary differences in the form of the human hair, colour of the skin, hair and eye, stature, form of the head, face and nose, and such others vary as the corresponding characters of our rabbits, mice, guinea-pigs, dogs and other domestic animals. In my domestication theory[1] (1914) I have tried to explain only the morphological similarities on similar physiological background and I believe today too, that the similarity of the hereditary behaviour may also be indicated.

Now, when we call the so-called racial differences as mutations, there is not the slightest ground before us to accept that a mutation should occur only once in the whole of mankind. The contrary seems to be rather the case. We have the most accurate knowledge of mutations in the Drosophila (in zoological branch). Hundreds of experiments show that numerous mutations occur independently and many times in pure-bred lines. Even the different Drosophila species (melanogaster, funebris, etc.), shows a completely parallel appearance of mutations for a large number of characters.

Among the mammalia we also find only the confirmation of this phenomenon without any contradiction whatsoever. The mutations in the hair form (Angora, grainy, etc.) appear in similar manner among rabbits, guinea-pigs, cats and others. The allelomorphic series of the hair colour, from the wild colour factor to pure albino, as shown by Nachtsheim for the rabbits, are similar in manner in all the investigated mammalian forms. What after all is seen in man, are the pathological mutations appearing in human groups in exactly the same way ; they certainly exclude a genetical relationship of the mutations concerned. The mutations in polydactyly, partial albinism or something like Huntington's chorea have undoubtedly originated indepedently several times and at diverse places, in man. The same may well be accepted for summerspots or freckles or for red hair. The conclusion, which follows is, that many other hereditary characteristics, which we now denote as systematic racial characteristics because of their appearance in groups, likewise appeared many times unrelated from one another. It may well be conceived in the nature of the gene that a mutation is possible in *fixed* directions and in *certain* directions only and that is possible up to a limited extent. It appears from the nature of the gene-position concerned, that it would be quite imposible for a canine tooth to become double the size

[1]E. W. Count has translated extracts of this essay in "This is Race", New York, 1951.

of normal as a result of mutation. It appears to be impossible, that the hereditary factors for human hair will so change that the latter will occur as thick bristles. But changes are easily possible in the direction of smaller or larger curvatures, *i.e.*, curly or frizzly hair, just as in the above mentioned Angora-haired animals.

As the starting point of investigation I accept the monophyletic origin of man for the classification of the systemic races in accordance with mendelian hereditary factors. This acceptance counts also the stage where mankind is unitary and with the same fundamental condition of the hereditary factors, originated out of an anthropoid stock. The uniform characters of these primitve men should be reconstructed from the knowledge of comparative anatomy of the anthropoids, from the fossil finds of Pithecanthropus, Neanderthals, and lastly in accordance with the definite morphological characters of the modern races. When the characters are distinguished as homogenous, their phenotypical variabilities around a given average should not naturally be denied or overlooked. In this common gene set-up such mutations appear, as can be proved according to mendelian methods, unrelated in time and space, conceiving of the gene easily and always capable of doing so. How out of such occurrence the origin of an individual race can be explained is even today open to criticism. The process of isolation, the occurrence of one and the same mutations, as also their collective appearance in a population, as Rosa in his Theory of Hologeny assumes, selection and the process of elimination are probably indispensable conceptions. The experimentally induced mutations in fixed direction, which Jollos has successfully performed, probably open the way to complete explanation.

From the standpoint of a monophyletic origin of man and a polyphyletic origin of the individual systemic races, the latter can be arranged in the following way. It is seen, that the larger individual groups (stems) differ from such other groups not through a single, but through quite a large number of mutations in fixed combinations. This on the other hand proves their homogeneity. There is evidently the possibility that two or more exactly same combinations should arise but they are extraordinarily infrequent. They become more improbable if the combinations are bigger and more peculiar. On the basis of this consideration I may then take up the four main stems, each with peculiar combinations of characters as originating

independently out of the preceding primitive mankind. I reserve for my detailed work[2] a description of the basic foundation and the comparison of my standpoint with that of other authors. We take first of all, the four stems, the Negrito, the Australoid, the European and the Mongolian and then the occurrence of one and the same mutation at different places of these stems, as advocated above ; and thus the origin of the most important characteristics will be represented in the following manner.

Spiral hair factor : The mutation to spirally curved hair arose from smooth hair and is met with where the Negroid stem has constituted itself. It appears to me, that it has multiplied twice within this stem (alleles) namely, at the origin of the Bushmen and possibly at the parallel origin of the Central African Pygmies (Fig. 1). In the Australoid stem I reckon the Negrito (Semang, Andamanese, Phillipine Islanders) as distinguished from the same mutation in hair from the Veddoids. Such a second mutation, appearing independently, created the Papua-Melanesian and a third, the Tasmanians. In the European stem it did not occur as an independent formation on the basis of this mutation, although it is not altogether rare in individuals. Finally, in the Mongolian stem, the mutation did not occur at all. It is possible to show, that the Mongolian hair form has originated from the mutation of smooth hair in an opposite direction. Then the appearance of the spiral mutation is not taken theoretically, because they would assume at least two similarly directed steps contrary to the step which led to the Mongolian race. One of the steps, which is taken up again by the straight hair factor, is found in individuals with smooth or loosely curved hair among the Mongolian or South American Indians ; so far they are not known to be due to new racial mixtures.

The *pygmy factor* is also due to mutation in the form of loss of stature, and this we must think of as an allelic series, so that a sharp line between pygmy, pygmoid and short stature cannot be drawn. It appears to me that the pygmy mutation (Fig. 2) has appeared independently twice in the Negroid stem and twice in the Australoid stem. I would like to conceive of its independent mutation among the Bushmen, the Central

[2]See Prof. Fishcher's later works, specially, "Versuch einer Genanalyse des Menschen" and "Versuch einer Phänogenetik der normalen körperlichen Eigenschaften des Menschen", *Zts. induk. Abstamm. u. Vererb.* (1930 and 1939).

African Pygmies, the New Guinea Pygmies, the Vedda and the Negritos. Similar independent mutations appear to have occurred (if really existing) among the neolithic pygmies of Europe, the short-statured Lapps and perhaps the Japanese in the Mongoloid stem.

A mutation (Fig. 3) in the gradual increase of stature may well be likewise conceived. The higher stature of the whole Negroid stem and its repeated increase in individuals of one of its branches perhaps in N.E. Africa, can be conceived as due to such mutation. The same has taken place in the case of the height in the Australians, in the European stem, a completely independent one in the Polynesians, the Dinarics and the Nordic races. And in the Mongoloid stem it might have occurred independently more than once ; partly along the many similarly directed steps of stature mutations, as also certainly in the tall-statured Asiatic Mongols and the North and the South American Indians.

Brachycephaly factor (Fig. 4) ; Possibly for no such character, valid as a racial character, has the polyphyletic origin of man been so much contested as brachycephaly. Hardly anybody will group together genetically the brachycephaly of certain Negro stems with that of the farther Asiatic races, the Bushmen or the Polynesians. A glance at Fig. 4 shows, how many-sided appearance of this factor can be conceived (though their nature, perhaps in the opinion of Frets, cannot be here entered into).

Strongly elevated convex nose (Fig. 5) must have similarly appeared many times as an independent mutation. It is characteristic that we do not find it at all in the Negroid stem ; in the Australoid stem it appears once (small-nosed Melanesians). On the contrary, in the European stem, through similar origin, the primitive human nose might have mutated into a somewhat elevated form, out of which further mutations have occurred in the same direction three times independently—in the Dinaric, in the Oriental and in the Nordic races. Lastly, the Mongoloid nose shows also the tendency to corresponding mutations, which is met with in individual cases and when the small convex noses of the Japanese are taken into account, as also in the building up of the strongly convex nose of the many Kirghiz tribes and above all the eagle nose of the many American Indian stems.

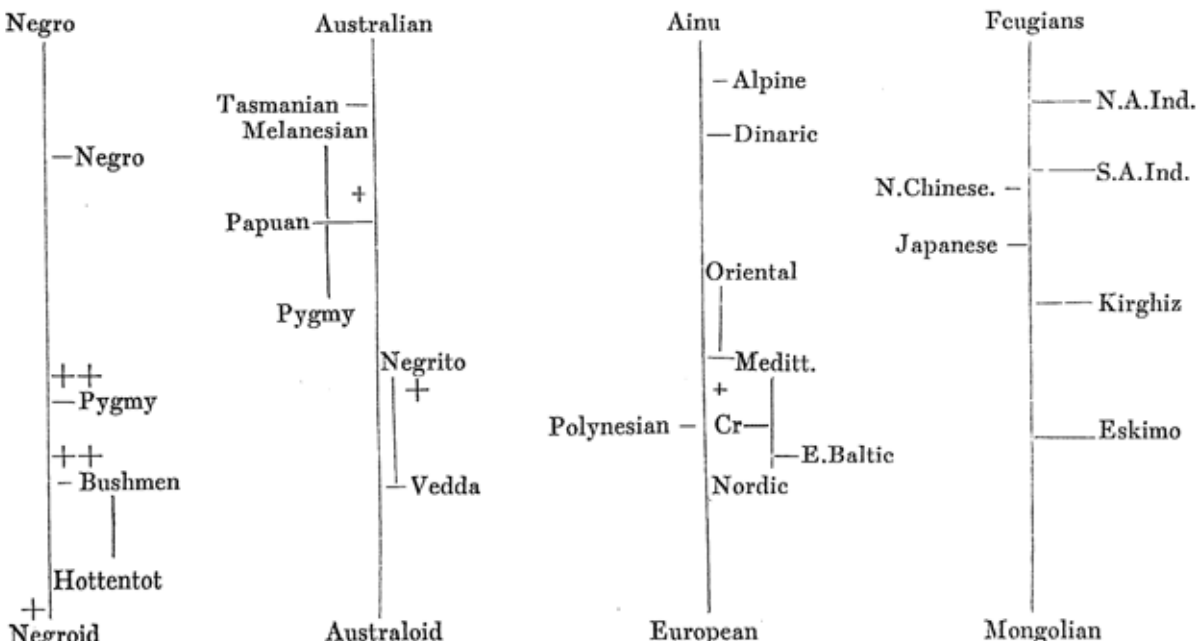
The *pigment factor of the skin* (Fig. 6) in the same way appears to give a particularly complex picture, because the starting point clearly belongs to the polymorphic alleles. A series for brown factor remains by the side of a series of yellow factor. In

both the series, multiplication or loss up to disappearance, can happen independent of one another. The main pigmentation generally develops along with hair pigmentation parallelwise, but their loss series begins before. Fig. 6 gives only the first process, the + and its independent appearance in the individual stems is shown.

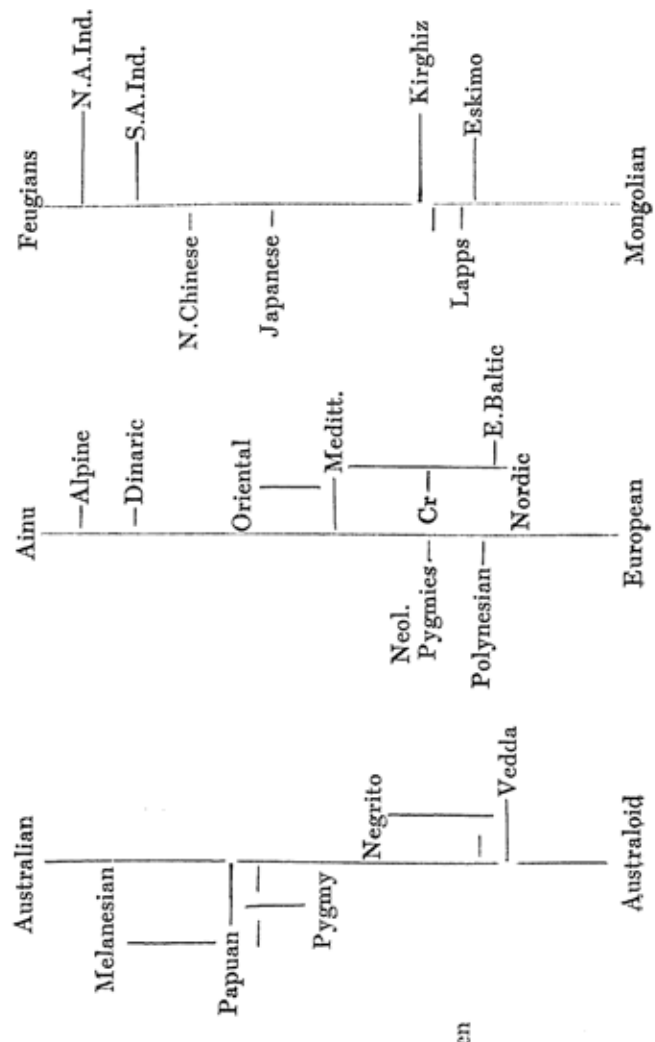
I am fully conscious of the hypothetical nature of my expositions ; it is an approach to the working out of the basic principles. Exact anthropological researches as done by Fritz Sarasin recently in New Caledonia, and on the other hand, a thorough basic investigations of all the crosses of the various hybrid combinations should enable us to support my sketch somewhat conclusively. The main theme, however, appears to me today already assured ; that it is impossible to classify and further to subdivide the human races systematically on the basis of an individual character.

Figs 1—6. In the figures + or — means the appearance of each one mutation. ++ means a further mutation in the same direction.

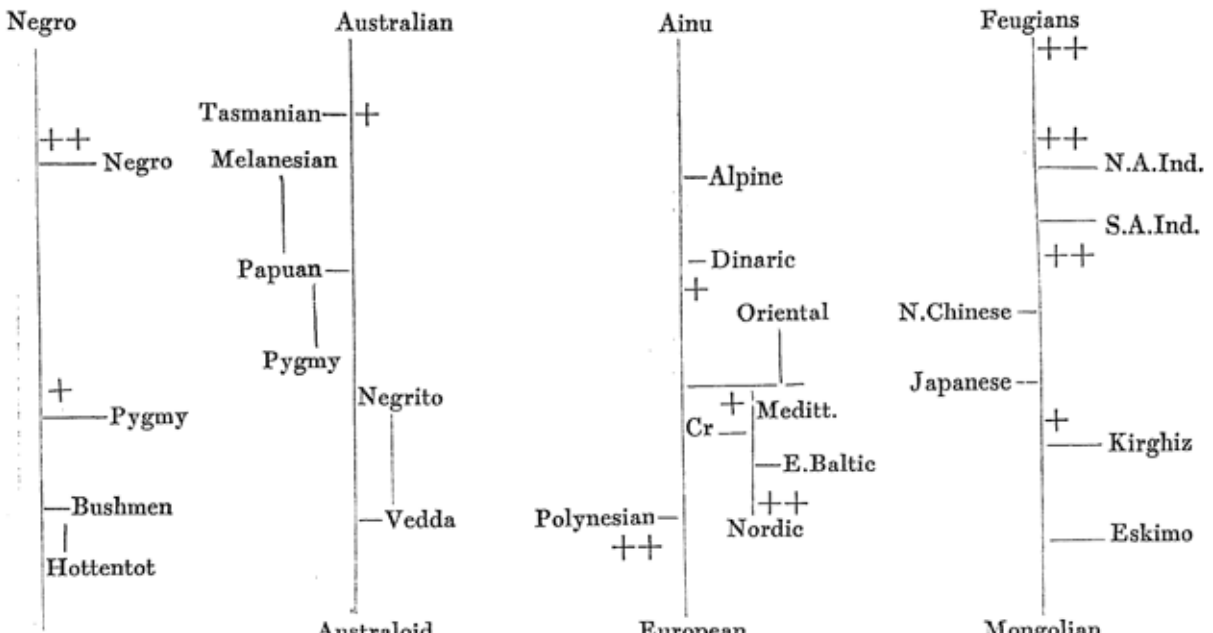
SPIRAL HAIR FACTOR
FIG—1



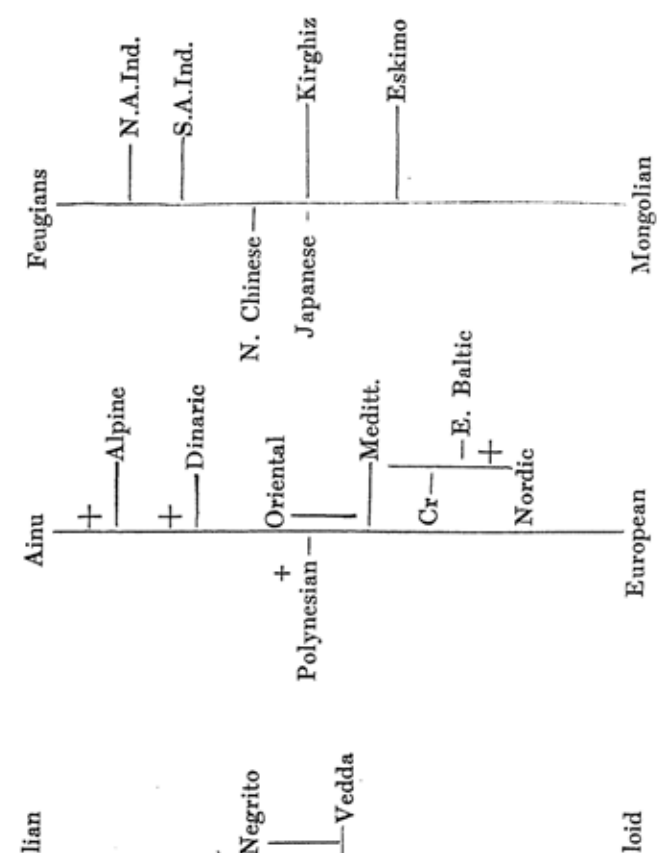
PYGMY FACTOR
FIG—2



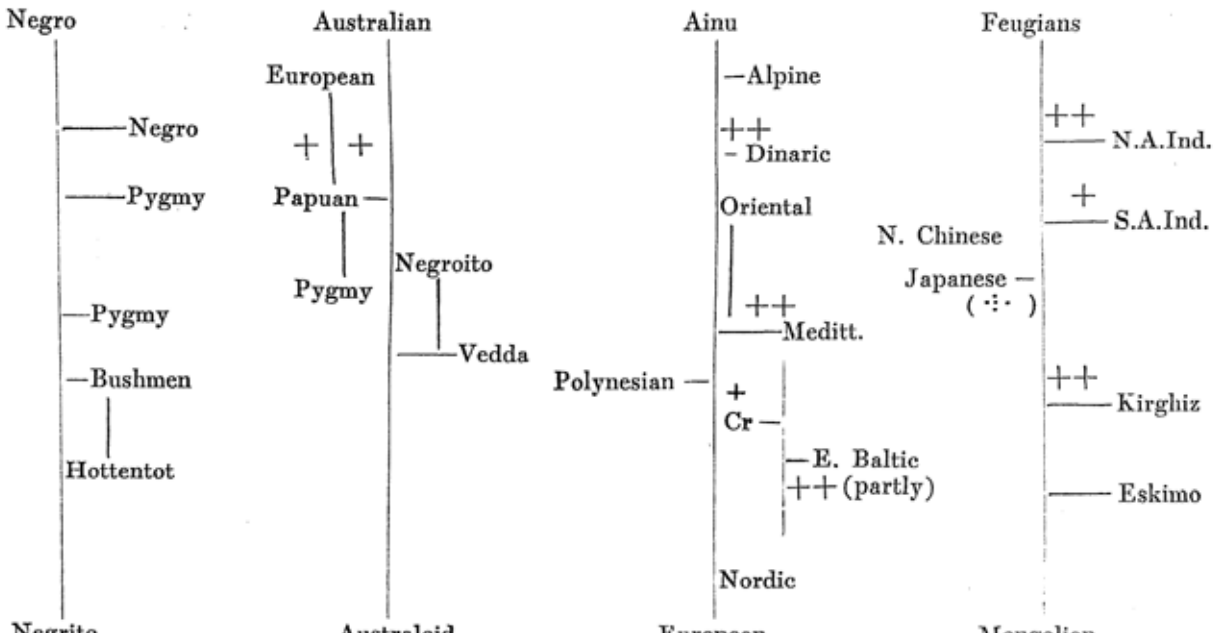
TALL STATURE FACTOR
FIG—3



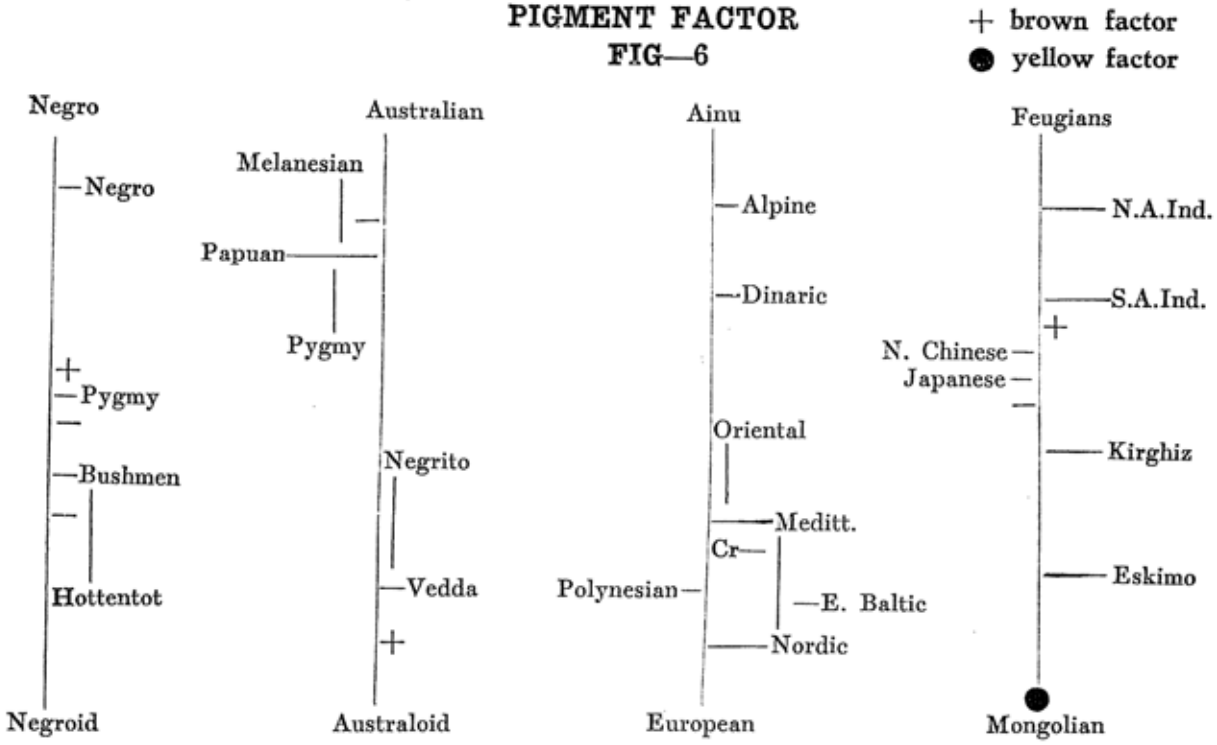
BRACHYCEPHALY FACTOR
FIG—4



FACTOR FOR CONVEX NOSE
FIG—5



PIGMENT FACTOR
FIG—6



CHAPTER II

RACIAL AFFINITIES OF THE PEOPLES OF INDIA*

BY

SIR ARTHUR KEITH

When Sir Herbert Risley took the Census of India in 1901 he not only numbered the heads of the population, but also sought to determine what kind of heads they were—an entirely new departure in the way of Census taking. When Dr. J. H. Hutton was appointed Census Commissioner in October, 1929, he resolved to continue and to extend the anthropological investigations which had been initiated by his predecessor of thirty years before. He therefore appealed for aid to his colleague, Lt. Col. R. B. Seymour Sewell, F.R.S., then Director of the Zoological Survey, with the result that Dr. B. S. Guha was entrusted with the task of preparing the Anthropological part of the Census Report. Dr. Guha's investigations began in 1930 and were continued until the summer of 1933, during which time he visited the most distant parts of India. Samples of the population were examined in the following regions : (1) North-Western Himalayan ; (2) Indo-Gangetic plain ; (3) Central India and Guzrat ; (4) Peninsular India ; (5) North-Eastern India ; (6) Assam ; (7) Burma. Besides these regional groups two others were added, one representing tribal peoples, and the other women of various regions, the data for the latter group being gathered by Madame Guha. Altogether 2,511 individuals were examined—all of which, with the exception of the female group of the Nicobarese[1], were measured by Dr. Guha himself. The individuals examined represented 34 racial groups, 14 of which were Brahmins, 16 various Hindu castes, and 4 tribesmen.

Eighteen measurements were made of the head and face of each individual ; besides these, observations were made on colour of skin, hair and eyes according to standardized methods ; other points, such as supra-orbital development, depth of nasal notch,

[1]Guha did not measure any Nicobarese at all. (author)

*Review of B. S. Guha's—Racial Affinities of the Peoples of India, Census of India, 1931, Vol. I, Pt. III (Reprinted with the permission of *Man* 29, 1936, (London).

epicanthic fold and texture of hair were also recorded. The numerous tables give the means and the amounts of variation stated in the manner with which the Bio-metrical School of London has made the world familiar. The Co-efficients of Racial Likeness for each group has been worked out according to the formula of Professor Pearson. In working out these degrees of likeness data gathered by many other observers have been used such as those of Dr. Mitra, Prof. Harrower, the late Mr. Thurston, the late Professor Dixon, Baron von Eickstedt, Sir T. Holland, Col. Waddell, Chanda, and particularly those of B. K. Chatterjee, Dr. Guha also utilized data which he had gathered during earlier anthropological forays into several regions of India.

Dr. Guha's report forms the first and the more important part of the present volume. Neverthless, the second part, which is entitled Ethnographic Notes by Dr. J. H. Hutton, contains much material of great interest for cultural as well as for physical anthropologists. Dr. Hutton here gives the notes he made during official tours through many parts of India, relating mostly to tribal peoples—Bhils, Gonds, Chenchus, Andamanese, Nicobarese, etc. Over a score of communications give records made by local observers. Many of these deserve special mention, but reasons of space forbid me from doing more than calling attention to the second part of this volume as a source of information for those interested in the cultural evolution of the peoples of India.

Perhaps the most outstanding result of Dr. Guha's survey has been the discovery that the peoples of India are brachycephalic to a much greater extent than has hitherto been suspected. He has prepared an excellent map of India which shows at a glance the distribution of head form ; the areas of the long heads are coloured blue ; those of the round heads, red. We may feel certain that if such a map had been prepared 8,000, or 10,000 years ago, when mankind was still in the primitive tribal stage of evolution, India would have been painted blue from the Himalayas to Cape Comorin. All the evidence at our disposal is in favour of the belief that the forms of brachycephaly now seen so widely spread amongst modern population were evolved, not in India, but north of the Himalayas. Dr. Guha's map shows brachycephaly (red) sweeping southwards round both ends of the Himalayas. From the Pamirs it descends through Afghanistan, Baluchistan, and Sind, and then extends continu-

ously along the west, broadening out from Bombay so as to include almost the whole Deccan. The red band sweeps across the peninsula so as to include southern Madras. Only a small area in the south is left as blue (dolichocephalic); it lies along the Malabar coast. From the eastern end of the Himalayas the brachycephalic (red) area passes from Bhutan and Tibet southwards, through Assam, to spread over Bengal and to end in Orissa. Thus all that is left of the dolichocephalic (blue) expanse is a central core, broad at the base, where it extends across the Indo-Gangetic plain from Sind to Bengal, sending a southward extension between Orissa and the Deccan to end north of Mysore. Only in Madras and in the isolated area in Travancore do the dolichocephals reach the sea. Such a map gives us a revolutionary conception of the anthropology of India.

How and when did brachycephaly enter and extend along the western parts of India? From the photographs of racial types which Dr. Guha has included in his report and which add so greatly to its value, one notices that the occiputs of the western round head is high and almost vertical; the form of brachycephaly is not of the rounded kind seen amongst Mongolian peoples, such as the Burmese and Tibetans. It is more akin to that seen in the peoples of the Pamirs and of Russian Turkestan. It has not the intensity to be observed so often in Armenians and Uzbegs. Along the south coast of Arabia, as Captain Bertram Thomas's data have proved, there exists a round-headed people, and the people at Oman, as Dr. Guha has noted, have the same form of occiput as is seen among the west coast peoples of India. The discovery of the ancient civilization of the Indus valley must alter our conception of the settlement of India; sea communication between Arabia and the west coast of India must be much older than has been believed hitherto. It is most probable that western India has been invaded from countries lying to the west and north of the Indus by sea as well as by land. So far as the present evidence goes the inhabitants of Mohenjodaro were predominantly dolichocephalic and big-headed.

Sir Herbert Risley was somewhat unfortunate in the names he gave to the racial types of India, particularly in describing the Bengali under the racial designation of Indo-Mongolian. I do not suppose that Sir Herbert meant to imply that the inhabitants of Bengal were derivatives of a mixed Mongol and Indian ancestry. Nevertheless the degree of brachycephaly amongst the Bengali has to be accounted for. Dr. Guha finds that certain

Guzrati groups of the west have a "co-efficient of racial likeness" with certain castes in Bengal which is sufficiently low to permit the inference that their kinship is not distant and that Bengal has obtained its brachycephaly from the west. Against this must be set certain difficulties ; (1) There is a wide belt of long-headedness (blue) between red Bengal and the red zone of the west ; (2) the brachycephaly of Bengal is an unbroken extension of the great eastern Mongolian zone, and is thus bound directly with Mongolian countries to the north ; (3) the brachycephaly of Bengal I believe to be—but on this more exact observations are much needed—of the rounded Mongolian, not of the Armenoid flat vertical type ; (4) there is evidence that the original population of Bengal was akin to the Khasi of Assam. It seems to me that the true explanation of the round headedness of the Bengali has still to be sought for.

Dr. Guha has applied biometric methods, to the elucidation of the evolutionary relationship which exists between the peoples of India with great loyalty of spirit. He is not blind, as is manifest from several passages in his report, to the uncertainty of 'the co-efficient of 'racial likeness' as a guide to the degree of kinship of one people with another. He holds that its results have to be accepted with caution. We can never hope to obtain a mathematical method that will equal the practised eye in determining the relative degrees of racial likeness. We could have wished for more photographs of racial types. Perhaps it would have been too extravagant to have printed full tables of individual measurements, but frequency curves showing the serial distribution of all the chief characters—particularly of the head indices would have added greatly to the value of this report without an undue increase of cost. One cannot tell, from the data given the percentage of brachycepahlic individuals in any of the racial samples reported on.

As has been mentioned, Dr. Guha's racial samples come from all parts of India—from the N.W. Frontier to Ceylon, and from Sind to Burma. And yet between the most extreme types all intermediate stages occur. Pigmentation increases as one passes from the N.W. to the S.E. Taking the co-efficients of racial likeness at their face value, it would be possible to bridge the 60 or 80 units, which separate any two extreme racial types with racial samples which lead by gradual steps from the one extreme to the other. The bridge which links the Pathans of the N.W. to the Hill Tribes of Travancore is still in existence. If evolution be true and if the 352 millions of people now in India

are members of the same great branch of humanity this ought to be the case. Yet, strange to say, all or nearly all, who have sought to explain the differentiation of the population of India into racial types have sought the solution of this problem outside the Peninsula. They have never attempted to ascertain how far India has bred her own races. They have proceeded on the assumption that evolution has taken place long ago and far away, but not in the great anthropological paradise of India. In this respect, Dr. Guha is neither better nor worse than his predecessors. No doubt India has been invaded over and over again ; certain racial types are of extraneous origin. But one would venture the opinion that 85 per cent of the blood in India is native to the soil. At least it is urgently necessary that our eyes should be more directly focused on the possibility of India being an evolutionary field—both now and in former times. Why has it been that, with the exception of the colonization of Assam, there is no clear evidence that any part of India has ever been a cradle of emigrant nations ? Her part in the past has been to receive and not to give.

When we turn to the pages in which Dr. Guha sums up the results of his investigations we find, I think, evidence of both sources of racial origin—foreign and native. In the racial composition of the peoples of India he discerns :—

(1) A type represented by the Telegu Brahmin—short of stature, long but small of head (small when compared with European standards), nose prominent and long, black-haired and dark, tawny brown in colour of skin. This Dr. Guha regards as the essential and prevalent Indian type, and I agree with him. Baron von Eickstedt has named it the *Melanide* racial type and regards it as a product of the open spaces of the Deccan.

(2) A type represented by the Nagar Brahmins ; it differs from the last chiefly in the form of head ; the occiput tends to be flat, not full as in the last. Dr. Guha regards type 1 as the basal form and type 2 as a superimposition (an intrusion) upon type 1.

(3) A type represented by the Pathan, taller and less pigmented than types 1 and 2 ; long-headed, long-faced, usually cast in a larger mould than types 1 and 2 ; nose long and prominent. This may be described as an Aryan type. Every stage between types 1 and 3 is to be found between Sind and Assam.

(4) A type which differs from type 1 in having a small flat nose, short wide face, hair black, wavy or curly. It predo-

minates among the tribes of central and southern India. It is akin to the Veddahs and to the Sakai of the Malay Peninsula. Baron von Eickstedt has named it the *Vedide* type or race, and regards it as a product of the hills. For my part I incline to regard Dr. Guha's type 1 as the evolved form of type 4 ; every stage in the passage from the lower to the higher is to be observed.

(5) A type which differs from the last only in its small make of body and in its tendency to have the hair spirally curled. The type is best seen amongst the Kadars and Pulayans of the south. This is but a variant of type 4 ; every stage between the two occurs.

(6) A brachycephalic mongoloid type represented by the Bhutanese ; it occurs along the foothills of the Himalayas from Kashmir to Assam.

(7) Another mongoloid type which differs from the last in the head being long rather than round, and with more pronounced nasal development than in type 6. Dr. Guha has cited the Angami Nagas as representative of this type. Shape of head is not necessarily a fundamental racial character. I believe types 6 and 7 represent the same stock, one which seems to have been evolved in, and formed the native population of N.E. India when tribalism prevailed throughout the Peninsula and when agriculture was still unknown in the land. Probably the chief factor in producing the racial turmoil in India has been the introduction of the art of agriculture.

In adding this volume to the census report Dr. Hutton has rendered anthropology a great service. Dr. Guha has seized his opportunities with both hands. India is better off than England ; India looks at her heads as well as counts them. It may be, in the racial vicissitudes which the distant future will bring forth, that London will stand to Delhi as Delhi now stands to London. In such an event it may be that a Census Commissioner will be appointed for these Islands. In such a case I hope he will remember that it was Sir Herbert Risley who instituted an anthropological survey for India, and so be moved to do the same for the Western Islands of Europe.

PART II

CHAPTER III

THE AUTOCHTHONES OF INDIA

The aboriginal tribes of India have been grouped in several ways under one generic name by various authors and so far there has been no agreement on this score. Lapicque (Keane, 1920) was probably responsible for the term Pre-Dravidian ; Ruggeri (Chakladar, 1921) named it Australoid-Veddaic while Chanda (1916) was in favour of the term *'Nishada.'* Eickstedt (1939) has used the term Veddid for those having closer affinity with the Veddas of Ceylon, while he has coined a number of other terms for the other aboriginal groups. Sewell and Guha (1929), in trying to find out the physical affinities of the Nal race, have described the Tamils and the Veddas as 'descendants of the original Proto-Australoid and Proto-Negroid blend'. They (1931) have also found the Proto-Australoid type occurring among the Mohenjodaro skeletal remains. Hutton (1933) followed the last two authors and used the term Proto-Australoid extensively in his Census Report for 1931. He even grouped the Veddas under Proto-Australoid. Guha in all his later works has consistently used the term Proto-Australoid. The latter term is not justified scientifically, for the Australoids have been recognized, since Huxley's time in 1870, as one of the fundamental stems in the evolutionary tree of man and we have no clear idea of the prototype of an Australoid.

The term Proto-Australoid owes its origin to Dixon (1923), who in writing his famous book, *The Racial History of Mankind,* chose a trinity of cephalic characters for classifying mankind. Tozzer and Coon (1943) in their preface to the Dixon Memorial Volume wrote as follows : 'Against the advice of his colleague, Professor Hooton, he abstracted all available published material on the craniology of contemporary peoples and fitted each skull into a framework of categories based on the interrelationship of three criteria : the cranial index, the length-height index of the skull, and the nasal index. * * Although this arbitrary procedure met with extensive criticism, and although no living physical anthropologist of repute would follow it to-day, his study of the craniology of all parts of the world on this basis served to upset a number of misconceptions as to racial relationships and pointed the way to other studies pursued by more tenable techniques. Dixon was the first, for example, to

indicate by means of scientific data the composite racial character of the American Indians, a conclusion which has been substantiated by more recent work in archaeology as well as in physical anthropology. To his death Dixon referred to *The Racial History of Mankind* as "my crime", but few of us thought that he regretted having committed it'.

Hooton (1930) introduced changes in Dixon's terminology ; but Guha (1951) has apparently been still using them, at least so far as the term Proto-Australoid is concerned. His point of view is not clear either, as will be evident from the following of his remarks (1935) : 'The Australoid type found so largely in the present day Indian aborigines, is however abundantly represented both in the Southern Indian and Chota Nagpur sites, and judging from the description given by the "Vedic Aryans" there seems hardly any doubt that they were the "Nisadas" who formerly as to-day occupied the hills and forests of India. Various names have been given to this race such as "Pre-Dravidian", "Proto-Australoid" and "Veddoid" but none of them seems to be as appropriate as "Nisadic" the generic name given to them by the "Vedic Aryans", and resuscitated by Mr. Chanda, and which should henceforth be used to designate the non-Negritoid Indian aborigines'.

So long the Australoid is regarded as one of the basic stems of mankind and its prototype is unknown, the use of the term Proto-Australoid seems to be unjustified. And above all, Dixon's admission, which is worthy of a scientist of his eminence alone, should be respected.

Hooton (1930) in his analysis of the Pecos Pueblo crania has replaced Dixon's Proto-Australoid by the term Pseudo-Australoid, while he has similarly renamed the Proto-Negroid as Pseudo-Negroid. It is worthwhile quoting Hooton here as it is relevant to South Indian affinities : 'The bulk of this Palae-American population must have consisted of people in whom the features of these three types (Pseudo-Australoid, Pseudo-Negroid, and Basket-Maker) were combined in various ways. If I were to hazard a guess as to their appearance it would be that they were not unlike some of the Dravidian inhabitants of Southern India short statured, slender in build, dolichocephalic, mesorrhine or platyrrhine, mesognathus and with face lacking the massive size and jutting malars characteristic of the later Indians. The skin color was probably brown and the hair form inclined to wave or to curl than in existing American Indian types.'

In the present chapter an attempt has been made to examine the Australoid affinities and along with it the Veddid affinities of some of the aboriginal tribes of India. For this purpose Eickstedt's terminology—Veddid, has been used. Eickstedt (1939) has already discussed the antiquity of this nomenclature. Guha (1951) in his recent paper recognizes the genetic relationship of the Indian aborigines with the Australians but objects to the generalized use of the term 'Veddoid'. We will discuss it towards the latter part of this chapter.

The Veddids in India and abroad

The Veddid tribes are still numerous in the jungles of South India. Although the few existing Veddas* are now locked up in Ceylon and were in the same place ever since they came to the notice of the anthropologists, it does not necessarily mean that they originated in Ceylon. On the other hand, what appears more probable is that they crossed over to Ceylon in course of their wanderings when the land bridge was in existence or when the sea level was low enough to be crossed over. The level of the sea sank to a depth of at least 40 fathoms during the beginning of the Ice Age in the Sunda shelf (Asiatic Bank) in consequence of the growth of the Pleistocene ice-caps (Molengraaff, 1921). The cave life of the Veddas points to an association with a rigorous climatic condition. Osman Hill (1941), whose monumental work on the existing Veddas can be reckoned as next to that of the Sarasins, is of opinion that the Veddas are the autochthones of the island. The Seligmans (1911) concluded that the Veddas belonged to the same race as the jungle tribes of South India. Howells (1937) also concurs with the general Australoid form and he finds it pronounced among the Veddas.

In South India, tribes having Veddid affinities have, so far, been classified under the general term Pre-Dravidian and a detailed study of some of the tribes, so far studied anthropometrically, has been attempted at the end of this chapter. A complete list of these tribes has yet to be made and the following can be included tentatively ; the Uralis, the Kannikars, and the Muthu-

*Dr. R. L. Spittel, a member of the Vedda Welfare Board and a famous authority on the Veddas, wrote to the writer in a personal communication : 'Most of the communities have quite disappeared in the last 25 years and even those that are left, are practically indistinguishable from Sinhalese or Tamils ; and except for a very few, resent being stigmatised as Vedda'.

vans of Travancore ; the Paniyans of Wynad, Malabar ; the Sholaga, the Kurumba, and the Irula of the Nilgiris ; the Chenchus of Hyderabad and the Kadars and the Malsars of Cochin. Apart from the above southern concentration, the northern extension is represented by the Mãle of the Rajmahal Hills and the Pahiras of the Dalma Hills, Manbhum. The Veddid element is strongly represented in both the above two tribes and both are yet locked up in the inhospitable hills where forests are gradually being encroached upon and there is a tendency of their coming down from the hills. The hills and the forests are intimately bound up with the Veddid way of life, and the fact that they were at one time numerous in the Southern and the Central Indian jungles will be apparent from the above geographical distribution. Veddid features are also sparsely met with in the Gangetic delta and its neighbourhood and there are certainly 'indications of a deeply submerged Australoid element' (Howells, 1937). Short stature, dolichocephaly and above all the 'retained infantile proportions' are the characteristics of the Veddid race.

Outside India, Veddid pockets have been reported on the west of India in Hadhramaut in Southern Arabia and in Persia (Coon, 1943). Towards the east of India, the Shom Pen of Great Nicobar, the Sakai of Malay Peninsula ; the Orang Mamaq, the Orang Batin (Sakai of Sumatra), the Lubu and Ulu of Sumatra (Loeb, 1935) ; the Nias Islanders (de Zwaan, 1925) ; the Toala of Celebes (Sarasin, 1906) and the Moi of the Indo-China Hills (Holbe, 1923) have been reported to have strong Veddid or mixed Veddid affinities. It should be mentioned here that the Toalas are brachycephalic and the Mois are mesocephalic and Howells finds them to be very much differing from the Australoids. The last outpost on the east is Australia. Birdsell (1950) has found a strong Veddoid element all over the northern half of Australia, which has been named Carpentarian by him.

It will be thus seen that with South India as centre, the Veddids fanned out both to the east and west, and they appear at one time to have been more widespread than now.

The Australoid element has also been suspected in the American Indian. It is yet a moot problem there (Seltzer, 1943).

Australoids first, Negritos second

A good deal of misconception on the problem of racial affinities in India can be removed if the evolutionary order of the two fundamental racial stems of mankind, namely, the

Australoid and the Negroid or Negritoid, is settled first of all. The problem is, who evolved first ; and although opinion appears to be rather weakly divided on this point, the majority are in favour of placing the Australoids first in the line of evolution.

The close of the Lower Palaeolithic is marked by the advent of the Neandarthals and if the views of Sollas and von Luschan are acceptable, the Australians have to be treated as the descendants of the Neandarthals. Huxley considered the Australians to be the nearest living representative of the Neandarthals. Keith (1925) however, thinks that the Australians are not the survivors of the Neandarthals but are one of the early forms of modern man. Howells (1937) has compared the Australian somatometric data with all available allied data and come to the conclusion : *'The Australian is not a blend but a major race, and is the most archaic race still surviving.'*

The earliest trace of the Negro dates to the Aurignacian period in the Grimaldi skeleton, to which Sollas is inclined to attribute certain Bushmen affinities. The Combe Capelle finds also belong to this period and Klaatsch emphasized its non-Neandarthalian characters and close affinity with the Australians. There is no doubt, however, that the Neandarthals appeared first in the scene and which, by implication, means the priority of the Australoids over the Negroes or the Negroids.

In Chapter I the views of Eugen Fischer have been discussed, in which the latter postulated the mutation of the woolly hair, one of the chief distinguishing characters of the Negroids, from the smooth, wavy hair, and as such the existence of a wavy-haired people prior to the Negro is undoubted.

Howells shares the same view and it is worthwhile quoting him *in extenso*. Towards the concluding part of his Australian race problem he wrote (1937) :

'Let us therefore examine the reasons for believing that, of the surviving races of man, the Australian is the oldest, and the Negro group, together with the Negrito, probably the second oldest.

'Proceeding inductively, we may postulate some of the characters of the immediate and direct progenitor of Homo sapiens, from the collective evidence of fossil types and of the Primate family in general. This is not difficult. Our ancestor was probably long-headed, with a low forehead and larger brow-ridges than at present ; he was likewise more prognathous, with

a larger palate and teeth and a smaller chin. Of his external characters we must ignore the color of his skin and say of his nose only that the root was probably low and broad. His hair was probably plentiful on his body, and, most important of all, was probably slightly wavy. At any rate, it was certainly not woolly, and most probably was not lankly straight like that of the highest Malays and Chinese, for no Primate hair can be strictly compared with either of these forms.'

'Here, then, is a reasonable picture of the proto-modern human stock. It is merely redundant to point out how much nearer such a type the Australian stands than does any other race, or to remember how convenient an adjective the word "Australoid" has become to express a primitive morphology. Furthermore the explanation of the hair form in Australia becomes a simple matter : the wavy hair does not result from the modification of a woolly-haired black people by a straighter-haired group, but has been retained from an ancestral form existing before woolly hair had ever appeared'.

In his essay on 'Physical Deterioration of Race', Howells (1940) enlarged this hypothesis : 'The rudimentary bodies, the *anlage*, so to speak, of the primary races did not, however, all bud from the common parent stock at the same time, and they have undergone specialization and progressed in the "human" direction to widely different degrees. The native Australian whose whole frame, is a what-not full of primitive human features, is obviously the oldest race (if the phrase has any meaning), having stagnated at this low stage of development while the rest of mankind advanced ; he exhibits neither specialization nor progressiveness. The Negro in all likelihood was next to follow the Australian into isolation, physical, and probably geographical as well ; he is highly specialized but not particularly progressive.'

It is difficult to reconcile this clear view of Howells with the following remarks from his pen : 'On the other hand, the Vedda can not be linked with the Negritos, due to their dolichocephaly ; however, the forest tribes in Southern India, with their short stature, very curly hair, and facial features, can only be satisfactorily explained by the assumption of a former Negrito population.'

In order to assume an earlier Negrito population at the basis of the jungle tribes of South India we have to assume a much earlier Australoid stock, at least earlier than the present

Veddids, who mutated to form the Negrito characteristics, since the process of formation is from wavy to woolly hair, or, to speak in terms of Howells, from stagnation to specialization. This is unnecessary in view of the complications involved in it and once the mutation hypothesis of Eugen Fischer is accepted we need not grope for explanations. Fischer has pointed out that the brachycephaly of the Negritos, the farther Asiatic races, the Bushmen and the Polynesian races can not be genetically brought together and he has also shown the possibility of a mutation in this character as well, in Fig. 4 of his paper.

Furthermore the dominance of brachycephaly is already well known and it is difficult to believe that the brachycephaly of the Negritos has been completely wiped out if it functioned as a basic element. Brachycephaly has increased in Bengal (Sarkar, Das and Agarwal, 1953) at least, and this increase has so far remained unnoticed in this country. It is worthwhile looking for this in other parts of the country ; but in any case we have to look for it in those regions where brachycephaly is already present.

The Negrito racial strain in a submerged condition has been found by Coon (1943) in southern Arabia and here the former differs from the Veddid strain not only in hair form but also in the head form. Coon writes : 'The population of southern Arabia, aside from the Yemen, consists of two major elements — Mediterranean and Veddoid. In the Hadhramaut valley, the agriculturists are predominantly Mediterranean ; among the Bedawin, and among the wilder tribes of the Dhofar region, the Veddoid element increases in importance. There is, however, a third element—frizzly haired, short statured, round headed, which occurs among sporadic individuals, and which is presumably Negrito. Individuals possessing these traits are not to be confused with African Negro hybrid who are well recognized and who are differentiated from the rest of the population in a social sense, nor with the Somalis. The tribesmen of Cape Musandam, in Oman, are said to be predominantly Negrito'.

Coon points out the submerged Negrito strain as a 'tentative identification' and seeks confirmation 'by further work on spot'. He however, suggests it to be 'the connecting link between the African and Oceanic Negroids'.

Australoids in Prehistory

Australoid types of crania have been found in the Indus Valley sites, which date from about 3500 B.C. Sewell and Guha

(1931) have found among the skeletal remains from Mohenjodaro three crania (Nos. 2, 11 and M) of the Proto-Australoid type. Friederichs and Muller (1933) have preferred to call the above three crania and that No. 10 as Veddoid, which Guha and Basu (1939) have remarked as "unfortunate, as the Vedda skulls have neither its size nor massiveness". They have on the other hand, following Keith, called the above skulls as Caucasic in type but have not gone into the other technical criticisms of Friederichs and Muller. Harappa has yielded a cemetery with two layers of burials, and the two layers show two distinct racial types (Appendix I). The lower-layer people appear to show some Australoid affinity similar to Mohenjodaro remains. Harappa has yielded many more skeletal remains than Mohenjodaro, but the main report has been published without any detailed description of the skeletal remains. In the short summary by Guha (Vats, 1940, p. 238), there is only a reference to two different racial types. During the winter of 1930-31 the present writer was responsible along with Mr. H. K. Basu for the excavation, preservation and the eventual removal of the skeletal remains from Harappa to the Indian Museum, Calcutta, and the list of skeletal remains published in the Harappa report (p. 242) shows them to have been 57 in number. Some more have been excavated by Mr. Basu (Wheeler, 1947) in the extension of the cemetery after the publication of the above report.

At Aditanallur in Tinnevelly district of South India—an Iron Age site—nine skulls were found. Guha in an earlier note published as an appendix to Chapter XVI of *Prehistoric India* (Mitra, 1927) stated that 'the Aditanallur crania conform to the Veddah type' while in his recent paper (1951) he says that they belong to the Proto-Australoid type. Of the two crania studied by Zuckerman and Elliot Smith (1930), one shows unmistakable Australoid affinity. The detailed report of these skulls too is long awaited from Guha.

Outside India, the Badarian crania have been found by Stoesigger (1927) to be 'as closely allied to the Dravidians and Kolarians as to the Early Predynastic Egyptians and are almost as close to the Veddahs'. The Badarian culture belongs to about 6000 B. C., and since that time the skeletal remains found in association with the prehistoric civilizations appear to be Australoid in nature ; nothing relating to the Negro or Negrito has so far been found.

TABLE I

Comparison of Means of Tribal Groups (all male)

Sr. No.	Characters	Australian			Vedda			Chenchu		Mäle			Kannikar			Kondh			Sr. No.
		No.	Range	Mean ± P. E.	No.	Range	Mean ± P. E.	No.	Mean ± P. E.	No.	Range	Mean ± P. E.	No.	Range	Mean ± P. E.	No.	Range	Mean ± P. E.	
1	Stature	239	152—187	168.30 ± .26	26	134—162	152.54 ± .83	23	164.95 ± .92	189	143—166	156.64 ± .26	140	139—163	153.17 ± .43	100	145—175	159.96 ± .37	1
2	Hd. Length.	239	173—211	189 93 ± .27	23	169—193	182.23 ± .93	23	185.17 ± .79	189	170—198	184.21 ± .27	140	175—196	184.59 ± .51	100	176—201	187.90 ± .30	2
3	Hd. Breadth	238	120—152	136.54 ± .23	25	122—144	132.76 ± .72	23	134.83 ± .74	189	125—147	137.23 ± .20	140	128—159	136.95 ± .40	100	127—150	138.20 ± .30	3
4	Hd. Height	226	98—142	124.29 ± .27	25	97—137	122.92 ± 1.12	23	120.48 ± .85	188	119—159	133.52 ± .33	140	100—139	116.68 ± .64	100	87—140	117.20 ± .60	4
5	Hor. Circ. Hd.	238	479—597	532.46 ± .71	21	456—574	531.80 ± 6.80	23	525.35 ± 1.86	91	503—563	532.05 ± 1.28	140	500—580	539.89 ± 1.35	×	×	×	5
6	Min. Fr. Diam.	235	89—120	104.82 ± .22	25	92—117	103.12 ± .77	23	100.83 ± .55	187	91—108	100.54 ± .17	140	90—117	103.34 ± .33	100	92—116	100.70 ± .30	6
7	Bizygo. Br.	239	120—159	139.85 ± .23	25	103—137	117.44 ± .90	23	129.00 ± .66	189	117—144	130.98 ± .22	140	119—142	128 36 ± .34	100	118—142	131.80 ± .40	7
8	Bigonial Br.	239	90—121	104.46 ± .25	22	79—110	93.73 ± .98	23	93.39 ± 1.29	188	81—112	96.89 ± .28	140	81—107	96.89 ± .86	100	84—110	97.10 ± .40	8
9	Nasal Ht.	238	32—67	47.38 ± .19	25	39—57	47.52 ± .76	23	48.22 ± .63	188	40—57	47.20 ± .17	140	40—56	47.44 ± .27	100	41—59	49.60 ± .30	9
10	Nasal Br.	237	31—60	47.15 ± .16	25	32—42	36.52 ± .33	23	38.98 ± .32	189	30—48	39.61 ± .14	140	33—45	37.81 ± .21	100	31—44	38.00 ±20	10
11	Tot. Fac. Ht.	236	95—129	111.70 ± .30	25	90—124	106.60 ± .32	23	110.00 ± 1.01	189	96—125	109.67 ± .28	140	94—125	109.49 ± .54	100	97—128	114.50 ± .50	11
12	Leng. Br. Ind.	236	62—82	71.82 ± .14	25	66—79	72.66 ± .46	23	72.89 ± .53	189	67—82	74.54 ± .13	140	68.4—87.85	74.26 ± .31	100	67.18—81.22	73.57 ± .18	12
13	Leng. Ht. Ind.	224	55—75	65.51 ± .16	25	56—75.5	67.68 ± .58	23	65.11 ± .49	187	65—83	72.17 ± .18	140	54.5—72.77	63.35 ± .37	100	45.31—75.68	60.84 ± .36	13
14	Nasal Ind.	223	76—131	100.74 ± .45	25	56—95	77.16 ± 1.31	23	81.38 ± .95	189	64—104	84.30 ± .43	140	66.0—97.56	80.11 ± .65	100	57.41—100	77.13 ± .53	14
15	Tot. Fac. Ind.	235	70—97	80.14 ± .22	25	64—107	91.37 ± 80	23	85.26 ± .61	189	73—95	83.74 ± .22	140	73.28—98.35	85 35 ± .45	100	73.57—105.60	86.13 ± .40	15

Australians and Australoids

Let us now take up the actual comparison of the Australian physical features (Howells, 1947) with some of the Australoids in India. The selected data from the latter are given in Table I.

In selecting the comparative material the primary criterion was the people having Veddid or alleged to have Veddid affinities. The next criterion was the completeness of the metric data. It is extremely difficult to find out suitable comparative data in this country and the few data utilized here for comparison are not wholly complete. Nothing is known of the maximum and minimum ranges of the Chenchu physical measurements and the horizontal circumference of the Kondh head. It was also intended to cover as much of the representative geographical area, particularly, to examine the northern position of the Māle. Thus commencing with the Veddas of Ceylon (Osman Hill, 1941) we come to their nearest geographical neighbour, the Kannikars of Travancore (Chatterji and Kumar, 1952), then to the Chenchus of Hyderabad (Guha, 1935) and then to the Kondhs of Madhya Pradesh (Ray, 1948) and finally to the Māle of the Rajmahal Hills (Sarkar, 1935-36). The primitive and the isolated nature of the people was also another criterion in selecting the tribes, and as such the Oraons were not included for comparison. The Oraons are a highly expanding tribe and in course of their sojourn from South India appear to have undergone many changes. The tradition of their common origin with the Māle has been found by the present writer (1938, 1942-43) to be untenable.

On the same grounds, it is extremely unfortunate that the Paniyans of Wynad, Malabar, and the Kadars of Cochin Hills could not be thoroughly discussed owing to the lack of any comprehensive metric data. Guha's Kadar data are not available and Thurston's (1908) data on these two tribes are appended in Table II.

TABLE II

	Kadar (23)		Paniyan (25)	
	Range	Mean	Range	Mean
Stature	1486—1694	1577	1520—1716	1574
Hd. Leng.	172—194	184	175—193	184
Hd. Br.	125—138	134	130—149	136
Cep. Ind.	69—80	72.9	69.4—81.1	74.0
Nas. Ind.	72.9—108.6	89.8	72.9—115.4	95.1

With their wavy hair, short stature, dolichocephalic head, platyrrhine nose and infantile characters they appear to be closely related to the other Veddids.

The Mundari-speaking peoples have not been taken into consideration here and it will be fitting with Bowles (1943) to treat them separately.

Guha (1951) in his recent paper has again raised the 'Proto-Australoid' question. He accepts Howells' main contention of the closest correspondence between the Veddas of Ceylon and the Australians and the likeness as 'unmistakable' and also 'the existence of a genetic relationship'. His only argument to call the Australoids as 'Proto-Australoid' is the 'comparative smallness' of the physical features of the Indian aborigines when compared with those of the Australian aborigines. Then he says : 'there seems no justification for calling them "Veddoid" when we consider, as shown by Howells, that the resemblance of the Vedda is much greater with the Australians than with any of the Indian tribes'.

It appears to the present writer that Howells has probably been slightly misrepresented. The quotation gives an idea that Howells has undertaken a comparison of the Veddas and other Indian tribes. Howells was handicapped by the lack of data, as will be evident from his remarks on pages 61 and 64 of his paper, and the only available Chenchu data of Guha were

assigned by him to have a strong Australian resemblance. He has emphasized of an Australoid element in the Indian aborigines in his paper more than once.

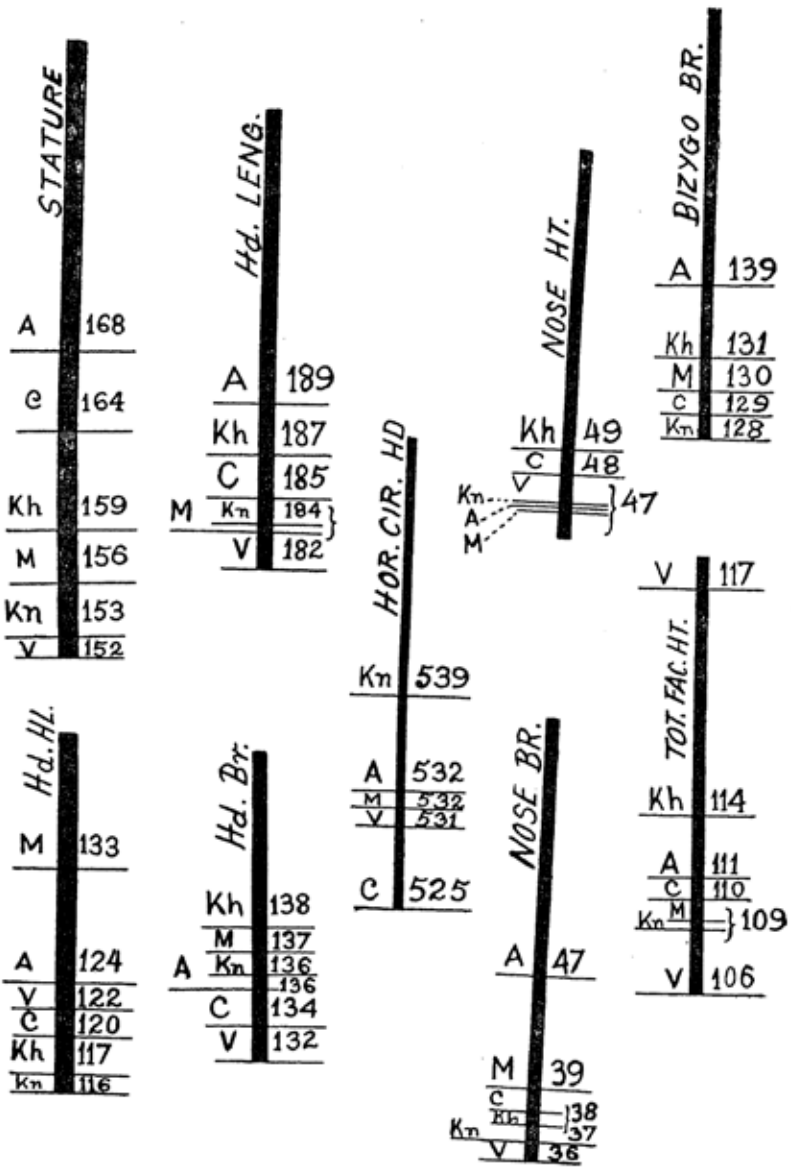


Fig. 7

Means arranged in descending order : A—Australian ; C—Chenchu ; Kh—Khond ; M—Mālé ; Kn—Kannikar ; V—Vedda.

A detailed comparative study with this end in view has not so far been undertaken—not even by Sewell and Guha before they proposed their 'Proto-Australoid' hypothesis. It will be seen from Fig. 7, where certain characters extracted from Table I, have been arranged in the descending order of their means, that the Indian aborigines are not always characterized by 'comparative smallness' when compared with the Australians.

The Australians occupy the topmost position of the arbitrary scale in 4 out of 9 characters shown in Fig. 7. Further, the Australians do not show any significant statistical difference in respect of certain characters.

In Table III the differences in the means of the various characters of the tribes have been given along with a quotient derived by dividing the difference by its probable error. The size of the inter-tribal differences as evidenced by the probable error has been extracted from Table III and shown separately in Table IV.

The Australian and the Vedda show close resemblance in respect of head height, horizontal circumference of head, minimum frontal diameter, nasal height and cephalic index while the Chenchu resemble the Australian in head breadth, nasal height, total facial height, cephalic index and length height index. Thus each of them show a 5 point resemblance with the Australian.

TABLE IV

SIZE OF INTER-TRIBAL DIFFERENCES IN TERMS OF PROBABLE ERROR

		0—1	1—2	2—3	3—4	4—×
1	Australian—Vedda	2	2	1	1	9
2	" —Mālé	2	0	1	0	12
3	" —Chenchu	1	3	1	2	8
4	" —Kannikar	3	0	0	1	11
5	" —Kondh	0	0	0	0	14
6	Vedda—Mālé	2	0	1	3	9
7	" —Chenchu	2	1	5	3	4
8	" —Kannikar	3	1	4	1	6
9	" —Kondh	1	1	2	2	8
10	Chenchu—Mālé	2	3	5	2	3
11	" —Kannikar	4	2	4	2	3
12	" —Kondh	3	3	2	3	3
13	Mālé—Kondh	2	1	1	0	10
14	" —Kannikar	6	0	0	1	8
15	Kannikar—Kondh	3	2	1	1	7

TABLE III

DIFFERENCES OF MEANS OF THE VARIOUS TRIBES WITH VALUES IN TERMS OF *P. E.*

Sr. No.		1 Australian Vedda		2 Australian Mālé		3 Australian Chenchu		4 Australian Kannikar		5 Australian Kondh		6 Vedda Mālé		7 Vedda Chenchu		8 Vedda Kondh		9 Vedda Kannikar		10 Chenchu Mālé		11 Chenchu Kannikar		12 Chenchu Kondh		13 Mālé Kondh		14 Mālé Kannikar		15 Kondh Kannikar		Sr. No.
		Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x.p.e.	
1.	Stature	15.76	18.11	11.66	31.51	3.35	3.53	15.13	30.26	8.34	18.53	4.10	4.71	12.41	10.01	7.42	8.15	0.63	0.68	8.31	8.74	11.78	20.31	4.99	5.04	3.32	7.38	3.47	6.94	6.79	11.91	1
2	Hd. Leng.	7.70	7.94	5.72	15.05	4.76	5.67	5.34	9.21	2.03	6.77	1.98	2.00	2.94	2.41	5.67	5.79	2.36	2.54	0.96	1.14	0.58	0.62	2 73	3.21	3.69	9 25	0 38	0.66	3.31	5.52	2
3	Hd. Bread.	3.78	4.85	0.69	2.30	1.71	2.19	0.41	0.89	1.66	4.37	4.47	5.96	2.07	2.01	5.44	6.97	4.19	5.05	2.40	3.12	2 12	2.52	3.37	4.21	0.97	2.69	0.28	0.62	1.25	2.50	3
4	Hd. Height.	1.37	1.18	9.23	21.47	3.81	4.28	7.61	10.87	7.09	10.74	10.60	9.06	2.44	1.73	5.72	4.50	6.24	4.84	13.04	14.33	3.80	3.58	3.28	3.15	16.32	24.0	16.84	23.39	0 52	0.59	4
5	Hor. Cir. Hd.	0.66	0.10	0.41	0.28	7.11	3.57	7.43	4.86	×	×	0.25	0.04	6.45	0.92	×	×	8.09	1.17	6.70	2.96	14.54	6.32	×	×	×	×	7.84	4.22	×	×	5
6	Min. Fr. Dia.	1.70	2.13	4.28	15.29	3.99	6.76	1.48	0.37	4.12	11.14	2.58	3.27	2.29	2.41	2.42	2 92	0.22	0.26	0.29	0.50	2.51	4.11	0.13	0.21	0.16	0.47	2.80	7.57	2.64	6.00	6
7	Bizygo. Br.	22.41	24.97	8 87	27.72	10.85	15.50	11.49	28.02	8.05	17.50	13.54	14.56	11.56	10.32	14.36	14.65	10.92	11.38	1.98	2.83	0.64	0.86	2.80	0.36	0.82	1.78	2.62	6.55	3.44	6.49	7
8	Bigonial Br.	10.73	10.62	7.57	19.92	11.07	8.45	7.57	8.51	7.36	15.66	3.16	3.10	0.34	2.10	3.37	3.18	3.16	2.43	3.50	2.65	3.50	2.26	3.71	2.75	0.21	0.43	0	0.90	0.21	0.22	8
9	Nasal Ht.	0.14	0.18	0.18	0.72	0.84	1.27	0.06	0.18	2.22	6.17	0.32	0.41	0.70	0.71	2.08	2.54	0.08	0.10	1.02	1.57	0.78	1.15	1.38	1.97	2.40	7.06	0.24	0.75	2.16	5.40	9
10	Nasal Br.	10.63	28.73	7.54	35.90	8.17	22.69	9.34	35.92	9.15	35.19	3.09	8.35	2.46	5.35	1.48	3.89	1.29	3.31	0.63	1.80	1.17	3.08	0 98	2 58	1.61	6.71	1.80	7.20	0.19	0.66	10
11	Tot. Fac. Ht.	5.10	11.59	2.03	4.95	1.70	1.63	2.21	3.56	2.80	4.83	3.07	7.14	3.40	3.21	7.90	13.17	2.89	4.59	0 33	0 31	0.51	0.44	4.50	0.40	4.83	8.47	0.18	0.30	5.01	6.77	11
12	Leng. Br. Ind.	0.84	1.75	2.72	14.32	1.07	1.95	2.44	7.18	1.75	7.61	1.88	3.92	0.23	3.29	0.91	1.86	1.60	2.91	1.65	3.06	1.37	2.25	0.68	1.21	0.97	4.41	0.28	0.82	0.69	1.92	12
13	Leng. Ht. Ind.	2.17	3.62	6.66	27.75	0.40	0.77	2.16	5.40	4.67	11.97	4.49	7.36	2 57	3.38	6 84	10.06	4.33	6.28	7.06	13.58	1.76	2.89	4.27	7.12	11.33	28.33	8.82	21.51	2.51	4.92	13
14	Nasal Ind.	23.58	16.96	16.44	26.52	19.36	18.44	20.63	26.11	23.61	33.73	7.14	5.17	4.22	2.61	0.03	0.02	2.95	2.02	2.92	2.81	1.27	1.10	4.25	3.90	7.17	10.54	4.19	5.37	2.98	3.55	14
15	Tot. Fac. Ind.	11.23	13.53	3.60	11.61	5.12	8.09	5.21	22.22	5.99	13.02	7.63	9.19	6.11	6.05	5.24	5.89	6.02	6.54	1.52	2.34	0.09	0.12	0.87	1.19	2.39	5.31	1.61	3.22	0.78	1.30	15

The Vedda, on the other hand, shows an 8 point resemblance with the Chenchu and the Kannikar each. Both agree with the Vedda in respect of head length, horizontal circumference of head, minimum frontal diameter, bigonial breadth, nasal height and nasal index. The other two characters besides the above 6 common characters, are head breadth and head height in the Chenchu, and stature and cephalic index for the Kannikar. The Kondh shows a 5 point resemblance with the Vedda.

The Chenchu, occupying the central geographical position, reveals an interesting feature. They show a 10 point resemblance each with the Mālé and the Kannikar while there is a 8 point resemblance with the Kondh. Both the Mālé and the Kannikar agree in common with the Chenchu in respect of head length, bizygomatic breadth, bigonial breadth, nasal height, nasal index, total facial height and total facial index. The other three characters, not found in common, are horizontal circumference of head, minimum frontal diameter and nasal breadth in the Mālé while in the Kannikar they are head breadth, length breadth index and length height index. The Chenchu and the Kondh resemble in minimum frontal diameter, bizygomatic breadth, bigonial breadth, nasal height, nasal breadth, total facial height, length breadth index and total facial index. Thus the Mālé, the Chenchu and the Kannikar agree with one another in the majority of characters and it would not be out of place if we regard them as the closest congeners.

Both the Chenchu and the Kannikar resemble the Vedda in 8 characters, as mentioned above, and we can, by implication, say that the Vedda, the Chenchu, the Kannikar and the Mālé were at one time close congeners. Thus Guha's opinion quoted above appears to be unwarranted ; in fact the resemblance of the Indian tribes with the Vedda is greater than that of the latter with the Australians and the nomenclature Veddid is fully justified in the racial affiliation of the tribes discussed in the present study and also to those allied to them here or abroad.

The present writer in 1938 referred to the Mālé as the autochthonous inhabitants of the Rajmahal Hills. The Paniyans, whose blood group picture have been so widely and rightly compared with the Australian blood groups, have not so far been subjected to serious study, and to the present writer they appear to be the truest representative of the Veddas in South India. These Veddids are the autochthones of the country ; they are the products of the soil.

Summary of the above

1. The history of the term 'Proto-Australoid' has been discussed.

2. The distribution of the Veddids in India and their extent outside India has been traced.

3. The evolution of the Australoids has occurred first while the Negrito appeared as a mutation from the Australoids. The woolly hair is a mutation from the wavy hair. The Australoids are stagnating at a low stage of development while the Negro or Negrito is a highly specialized form.

4. The Australoid skeletal remains date as early as Badarian times and during the prehistoric times in India the Australoid types only predominate.

5. A statistical treatment of the anthropometric data from the Australians, the Veddas and a few other Indian aborigines has been made. The Mundari-speaking peoples have been left out of the present study.

6. The statistical treatment reveals an 8 point resemblance between the Vedda, the Chenchu and the Kannikar and a 10 point resemblance between the Chenchu, the Mālé, the Kannikar and the Kondh. This relationship is indicative of a close racial affinity with the Vedda and the nomenclature Veddid for such people is justified.

Skeletal Remains

The skeletal remains of the Australoids discussed before are very few. Osman Hill (1941, 1942) has made a detailed study of the Vedda skeletal remains, which includes remains of 68 Veddas from the different museums of Great Britain, Colombo, India, his own collection and those of Dr. R. L. Spittel. The present author has already published two studies of the Mālé skeleton (1934-35, 1938-39) which are also incorporated here.

Although the authenticity of the aboriginal skulls and skeletons is in the majority of cases doubtful, they form part of the collection of the many museums of India and there has been so far no attempt to enlist them in the form of a catalogue even. The anthropological section ot the Indian Museum, Calcutta, possesses probably the largest of its kind in India where too no systematic study or even a catalogue has been attempted. The collection has been in charge of the Director, Department of Anthropology since 1946. Some of the above collection, the

Burmese crania from the old burial ground of Prome (1931-32), the Munda (1932-33) and the Oraon (1933-34) crania have been studied by the late Dr. P. C. Basu.

The first lot of Mālé skeletal remains was recovered during September, 1935, from the hill village cemetery of *Danowar* (Rajmahal subdivision). They comprised two femora, the left tibia and the upper third of the left fibula. A second lot of long bones was also recovered in February, 1937, from the denser part of the above cemetery. In March, 1938, a large number of human bones were also recovered from the *Guma Pahar** cemetery at Durgapur (Rajmahal) and forms till now the largest collection of authentic skeletal remains of the Mālér. At the latter place remains of more than one single individual were found, of which the larger number belongs to a female. A skull, a complete pelvic girdle and the two pairs of long bones of the lower extremity can be identified as belonging to the female. This latter skeleton appeared to be a comparatively recent burial since the dried up tissue fibres were still adhering to the bones.

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* The *Guma Pahar* cemetery is situated at a distance of about quarter of a mile from the village on a much higher level than the latter. The author had been to the spot with a Mālé boy (Fig. 8) and a village watchman. When the skeletal remains were seen the Mālé boy was asked to bring from his village an old basket in which the bones could be carried. The boy returned with a small basket and when he saw the author picking up the bones he at first refused to give the basket. The villagers could see all what is being done in the cemetery and they all grew curious when the basket was brought. Further, a woman from the village cried out to the boy something, at which the latter replied. Immediately the women began to weep loudly and the author was compelled to suspend any further search for the bones, lest anything untoward may happen. The collected bones were somehow piled upon the basket and a part tied in the cloth of the watchman and the latter was asked to carry it to the Dak Bungalow through the jungle path which does not touch the village. The author came down to the village and saw the women weeping in a body while the men stood in a row opposite to them. The author had left the officers of the forest department in the village who had already begun the task of consoling them. The author explained to the villagers that the bones are not intended for any magical purposes and they will be reburied as they were not properly buried there. The greatest difficulty was to console a young married girl who had recently lost her mother and was also buried in the same cemetery.

Fig. 8. Mâlé Cemetry at Guma Pahar, Durgapur, Rajmahal.

For facilities of comparison the measurements of the long bones published before, have been incorporated here.

The skeletal parts.

The total human remains from *Danowar* are as follows :—

(*a*) Humerus—Right and left ; upper and lower ends missing.

(*b*) Ulna—Right, head and lower end missing.

Here too, as in *Danowar,* persons dying of small-pox (Sarkar, 1938) are not buried. Further, remains from a few graves appear to have been taken out by wild animals and it appeared that the dead is not so securely buried here. This can be very well seen from a burial in the photograph where the dead is buried and covered by an inverted string cot. In other places, large stone boulders are placed after the body is covered with earth. The rocky nature of the soil of the cemetery of *Guma Pahar* stands in the way of making deep ditches for burials.

(*c*) Femur—Right and left ; right complete ; articular head and neck of the left missing.

(*d*) Tibia—Right and left ; left complete ; upper and lower ends of the right missing.

(*e*) Fibula—Right and left ; upper and lower ends of both missing.

The human remains from the *Guma Pahar* cemetery are as follows :—

(*a*) Skull—Female, complete, parts of the basi-occipital and the palate missing.

(*b*) Skull—Male, facial portion completely missing, parts of right and left parietals broken. The skull was found in fragments but reconstruction has been possible due to the presence of the majority of the articular surfaces of the frontal and other bones.

(*c*) Lower Jaw—Complete ; of the teeth only the right second molar was found embedded in the mandible.

(*d*) Scapula—Left ; complete, excepting a small end of the acromion process.

(*e*) Humerus—Left ; complete.

(*f*) Radius—Right ; complete.

(*g*) Ulna—Right and left ; left complete ; lower end of the right missing.

(*h*) Pelvic girdle—Complete with two *Os Coxae* and a sacrum.

(*i*) Femur—(i) Complete right and left of an individual ; fits well into the sockets of the above pelvic girdle.

(ii) Right of a second individual ; epiphysis worn out.

(iii) Right of a third individual ; only lower third present.

(*j*) Tibia—(i) Right and left of an individual ; complete.

(ii) Left of an individual ; condyles worn out and lower malleolus missing.

(*k*) Fibula—Left ; lower part missing.

(*l*) Astragalus—Left ; complete.

The above forms the complete list of the bones which will be described here.

The pelvic girdle belongs to a female individual and the two pairs of the femur and the tibia together with the astragalus and the fibula can be associated with it as are evident from the well-fitted articulating surfaces of the corresponding bones. It is also not unlikely, that the female skull and the almost complete lower limb belong to the same individual. Similarly, the left ulna can be very well articulated at the olecranon process of the left humerus and they appear to belong to the same individual. The *Danowar* remains, from the general texture of the bones and for reasons mentioned below, appear to belong to the same individual whereas at *Guma Pahar* we have skeletal remains of at least three individuals. The bones have been described according to their normal anatomical order. All the measurements have been given in millimetres.

The skull.

The skulls, one male (Pl. V, *a-c*) and one female (Pl. IV) found at *Guma Pahar,* belong to adults. The female skull is complete and is in a better state of preservation than the male. In the female skull, only a part of the right zygoma and the malar bones are missing and excepting the absence of a few soft parts of the palate and the basioccipital, the skull is complete for all osteometric purposes. The male skull was found in fragments and the facial part is entirely missing. Even after reconstruction of the fragments, a large part of the two parietals at the coronal suture were missing. The right occipital bone has also undergone some amount of flattening at the region of the parietal tuberosity and though it has been found possible to articulate the bone at the right lamboidal suture, interspaces are to be seen at the region of the right asterion. This has to some extent affected the maximum cranial breadth of the skull. The frontal bone can also be articulated with the left parietal at the left coronal suture in the region of pterion and with the sphenoid at the right sphenoidal suture. It is possible that the cranial length also has been very slightly affected.

For facilities of comparison, it will be worth while to describe the two skulls together.

Norma Verticalis

Fig. 9. Vertical view of the Male cranium × ½.

Viewed from the top (Fig. 9) both the skulls show an elongated shape which is more marked in the case of the male than the female. The female skull has a narrow and tapering frontal bone which is broad in the male. The difference is, however, very much marked on the occipital side of the two skulls. In the female skull the parietals fall down abruptly and practically nothing of the occipital bone can be seen, while in the male skull the occipital bone bulges out to form a distinct curvature of its own and is also marked by a depressed surface in the region of the lambda.

Norma occipitalis

Viewed from the back (Fig. 10) the female skull shows a characteristic curvature towards the basal surface at the com-

mencement of the superior nuchal line and the area of the muscle attachments is broader than that of the male, though however, the muscular impressions are deeper in the latter. The pattern of the lamboid suture is more complicated in the female than that of the male.

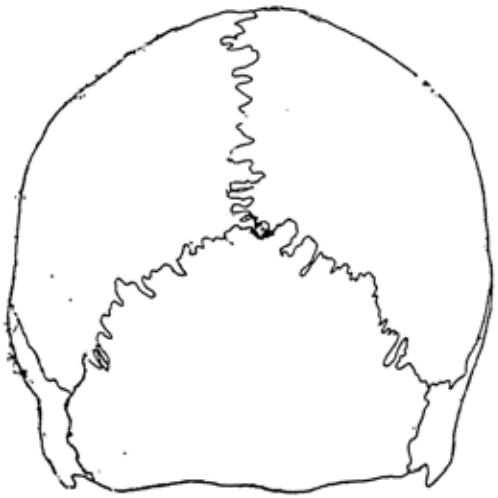

Fig. 10. Occipital view of the Mālé ♀ cranium × ½.

Norma basilaris

At the basal surface, the female skull (Pl. IV,*c*) presents a larger occipital area than that found in the male skull (Pl. V, *b*). The male skull, however, shows deeper muscular impressions. The basilar process of the occipital bone is flat and broad in the male while it is rounded and constricted at the middle in the female. To this is due the larger opening of the carotid canal than that of the male. The foramen ovale, on the other hand, is much larger in the male than that of the female. In the male skull there is a foramen at the back of the left occipital condyle, which leads to the jugular foramen. The female skull has a conspicuously large left styloid process. The mastoids are larger in the male, while in the female the points are somewhat curved inwards. The digastric fossa is deeper in the female than that of the male.

The palate is present only in the female skull. All the teeth were erupted and in this skull, only the three left molars, the first molars, the first left premolar and the first right molar are

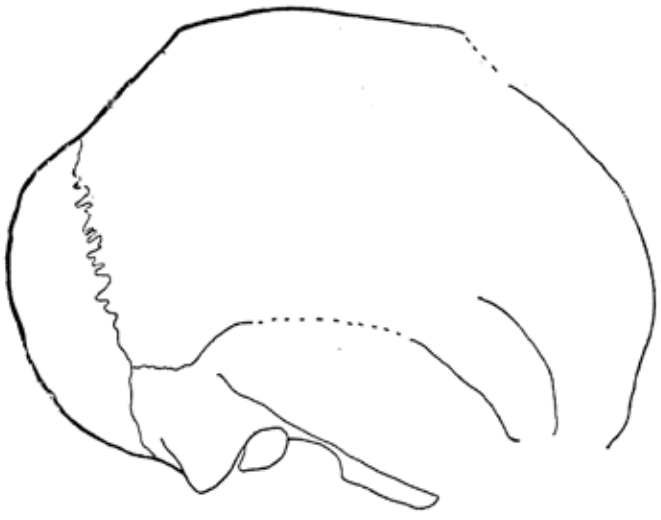

Fig. 11. Lateral view of the Mālé ♂ cranium × ½ (on n-i plane).

present. The right molars seem to be more worn out than those of the left.

Norma lateralis

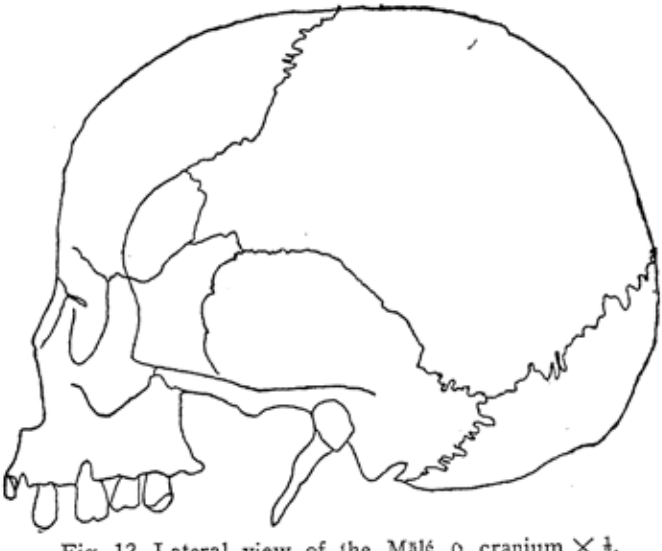

Fig. 12. Lateral view of the Mālé ♀ cranium × ½.

Viewed from the side the male skull (Fig. 11) is characterized by the bulging occiput and the frontal eminences.

In the female skull (Fig. 12) the forehead bends down into a smooth vertical slope whereas the male skull has prominent supraorbital ridges and frontal eminences. Both the skulls are marked by a greater preauricular development, which is however slightly larger in the male than the female. The left styloid process of the female skull is very well preserved and shows an inwardly bent curvature. The female skull shows slight alveolar prognathism.

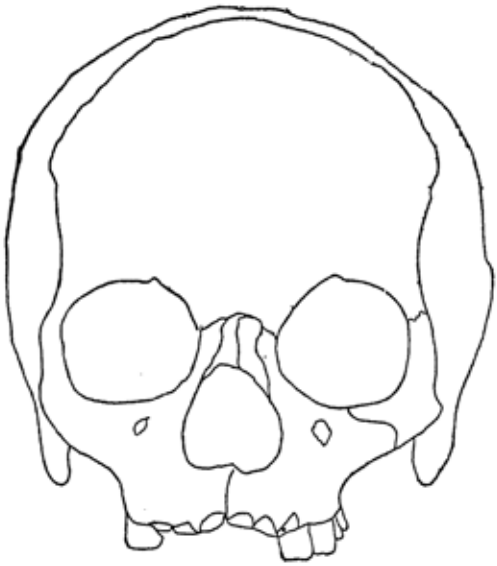

Fig. 13. Frontal view of the Mālé ♀ cranium × ½.

Norma facialis

The facial portion of the male skull is missing but the peculiarities of the frontal bone are marked. The frontal bone presents two eminences ; the glabella and the supraorbital ridges are well marked. In the female skull (Fig. 13) the frontal tuberosities are not well marked. The orbits are circular and the nasal aperture is pyriform. The subnasal spine is prominent. The male skull shows two supraorbital foramina which are in the shape of notches in the female.

Form of the Head.

The male Mālé skull is dolichocranial, the cranial index being 72.46 while the female skull with an index of 79.62 shows a brachycranial tendency. Both the skulls, however, have undergone some amount of postmortem changes, especially the male, and it appears that they have affected the cranial indices to a certain extent. Both the skulls are low-vaulted ; the auricular heights measured by Davidson Black's Calottemeter with the skulls placed on Mollison's craniophore are 105 mm. for the female and 107 mm. for the male.

The cranial forms of the two skulls fairly agree with the averages for living subjects measured by the present author (1935-36). The average cephalic index of the Mālér males derived from 188 individuals* was 74.54 while the average of the females derived from the measurements of 7 individuals was found to be 78.59. This gives not only a mesocephalic value but when the 7 individuals are considered separately the actual number of people having a brachycephalic index was 42.86%. The true character of the female head cannot, however, be definitely judged from such a small sample. The 7 cephalic indices are as follows :—81.50, 68.54, 75.82, 81.65, 76.24, 74.86 and 80.12. Of the seven 2 are definitely brachycephalic whereas the latter was found to be 1.06% among the males.

Cranial Capacity.

The cranial capacity of the Mālé female skull is 970 c.c. only. It has been estimated firstly by mustard seeds[1] and the three readings are as follows :—

1st Reading	..	960 c.c.
2nd Reading	..	960 c.c.
3rd Reading	..	970 c.c.

* No individuals from Durgapur, however, were measured, as it lies on the margin and it was thought that other strains might have entered into this region.

[1] The graduated glass cylinder, into which the mustard seeds were put, is fitted with a wooden stopper at the mouth through which a wooden piston is allowed into the cylinder to press the seeds. This apparatus belongs to the Anthropological Laboratory

This gives a mean capacity of 963 c.c. In order to check this result the absolute capacity was determined by water after the whole skull was covered with paraffin wax. With the usual controls necessary in such an experiment the cranial capacity was found to be 970 c.c. only.

TABLE V

Cranial Measurements

	Skull	Mālé	Mālé	Munda (Basu)	Vedda (Sarasin)
	Sex	♂	♀	♀	♀
1.	Maximum cranial length ..	167	157	165	179
2.	Maximum cranial breadth ..	121 ?	125	112	123
3.	Nasion inion length ..	148	148	148	..
4.	Basilo-bregmatic height ..	..	118	130	..
5.	Least frontal breadth ..	91.5	91	88	..
6.	Greatest frontal breadth ..	111	100	99	..
7.	Bimastoid breadth ..	99	100	94	..
8.	Bizygomatic breadth ..	..	..	116	108
9.	Nasion basion line ..	92	95	98	91
10.	Prosthion basion line ..	..	85	94	..
11.	Nasion gnathion line ..	..	..	..	98
12.	Nasion prosthion line ..	..	52	56	56.5
13.	Nasal length	..	41	42	41.5
14.	Nasal breadth	..	25	25	23.75
15.	Interorbital breadth ..	..	20	19	19
16.	Orbital breadth—				
	Right	..	34	35	..
	Left	..	..	35	..
17.	Orbital height—				
	Right	..	31	29	..
	Left	..	31	30	..

of the Indian Museum, Calcutta, and was manufactured by Andrew H. Baird of Edinburgh. The cranial capacities of the skulls measured by Gupte in *Craniological Data from the Indian Museum, Calcutta, 1909*, were determined with the help of this apparatus. In measuring the cranial capacity with mustard seeds I have followed Mollison (*Spezielle Methoden anthropologischer Messung, Handbuch der biologischen Arbeitsmethoden, Abt. VII, Teil 2, Heft 3, 1938*, p. 626) though the seeds were poured into the skull with the help of an ordinary glass funnel used in chemical laboratories instead of the metal one suggested by him.

TABLE V—contd.

Cranial Measurements (contd.)

Skull	Mālé	Mālé	Munda (Basu)	Vedda (Sarasin)
Sex	♂	♀	♀	♀
18. Maxilloalveolar length ..	..	..	49	..
19. Maxilloalveolar breadth ..	..	55	62	..
20. Palatal length	..	..	49	..
21. Palatal breadth	..	35	37	..
22. Occipital foramen—				
Length	33	33	31	..
Breadth	28	25	27	..
23. Auricular height	107 ?	105	..	126.5
24. Sagittal cranial arc ..	344	330	335	367
25. Transverse cranial arc ..	..	283	268	..
26. Horizontal circumference ..	462	455	455	..
27. Biauricular breadth ..	104	103	104	..
28. Outer biorbital breadth ..	..	96	98	..
29. Inner biorbital breadth ..	..	90	99	..
30. Greatest occipital breadth ..	96	94	90	..
31. Frontal arc	..	120	113	..
32. Parietal arc	..	117	120	..
33. Occipital arc	107	93	102	..
34. Frontal chord	..	101	99	..
35. Parietal chord	..	101	107	..
36. Occipital chord	85	77	87	..
37. Length of 1st Molar (Upper)—				
Right — Anteroposterior ..	..	10	9	..
Right — Transverse ..	..	11	11	..
Left — Anteroposterior ..	..	10	9	..
Left — Transverse ..	..	10	11	..
38. Length of 2nd Molar (Upper)—				
Right — Anteroposterior ..	..	..	9	..
Right — Transverse ..	..	..	11	..
Left — Anteroposterior ..	..	8	9	..
Left — Transverse ..	..	10	11	..
39. Biorbitonasal arc ..	..	97	100	..
40. Nasion lambda line ..	154	153	158	..
41. Calvarial height	99	95	100	..
42. Lambda calvarial height ..	68	67	66	..
43. Bregma position line ..	..	87.5	89	..
44. Frontal perpendicular ..	..	25	24	..
45. Parietal perpendicular ..	..	25	22	..
46. Occipital perpendicular ..	26	21	23	..
47. Frontal inclination angle ..	..	60°	65°	..
48. Occipital inclination angle ..	86°	89°	87°	..
49. Facial profile angle ..	..	80°	84°	..
50. Calvarial base angle ..	..	10°	10°	..
51. Frontal curvature angle ..	..	125°	130°	..
52. Parietal curvature angle ..	..	127°	135°	..
53. Occipital curvature angle ..	117°	124°	125°	..

TABLE V—contd.

Cranial Measurements (contd.)

Skull	Mālé	Mālé	Munda (Basu)	Vedda (Sarasin)
Sex	♂	♀	♀	♀
54. Occipital flexional angle ..	118°	124°	125°	..
55. Superior facial length angle ..	..	35°	32°	..
56. Nasion to foot of bregma perpendicular	..	51	41	..
57. Cranial capacity in c.c. ..	..	970 (Estimated)	1100 (Calculated)	1175 (Estimated)
Indices of the cranium.				
1. Length breadth index ..	72.46	79.62	67.88	68.7
2. Length height index ..	..	75.16	78.79	70.7
3. Breadth height index ..	..	94.40	116.07	..
4. Calvarial height index ..	66.89	64.19	67.57	..
5. Bregma position index ..	..	34.46	27.70	..
6. Sagittal cranial curvature index	43.02	44.85	44.17	..
7. Transverse cranial curvature index	..	22.64	38.80	..
8. Transverse fronto-parietal index	75.61	72.80	78.57	..
Indices showing the relations of the various Sagittal arcs.				
1. Fronto-parietal index ..	..	97.50	106.19	..
2. Fronto-occipital index ..	..	77.50	90.27	..
3. Parieto-occipital index ..	..	79.49	85.00	..
4. Fronto-sagittal arc index ..	..	36 36	33.73	..
5. Parieto-sagittal arc index ..	..	35.45	35.82	..
6. Occipito-sagittal arc index ..	31.10	28.18	30.44	..
Indices showing the amount of curvature (bulging) of each of the three contour bones of the cranium.				
1. Frontal curvature index ..	..	84.17	74.44	..
2. Parietal curvature index ..	..	86.32	89.17	..
3. Occipital curvature index ..	79.44	82.80	85.29	..
Indices of the Face.				
1. Total facial index ..	..	..	..	..
2. Superior facial index ..	..	..	48.27	..
3. Zygomatico frontal index ..	..	..	75.86	..
4. Orbital index—				
Right	..	97.18	82.85	..
Left	..	..	..	
5. Nasal index	..	60.98	59.52	57.2

TABLE V—concld.

Cranial Measurements (concld.)

Skull	Mālé	Mālé	Mundā (Basu)	Veddā (Sarasin)
Sex	♂	♀	♀	♀
Indices showing relations between cranium and face.				
1. Longitudinal cranio-facial index	..	54.14	34.57	..
2. Transverse cranio-facial index	..	..	103.57	..
3. Vertical cranio-facial index ..	..	44.07	43.07	..
Some additional indices.				
1. Lambda calvarial height index	44.16	43.79	41.51	..
2. Frontal perpendicular index	..	24.75	24.24	..
3. Parietal perpendicular index	..	24.75	20.56	..
4. Occipital perpendicular index	30.59	27.27	26.44	..

TABLE VI

Measurements of the face in the anteroposterior plane

(Mālé, ♀ skull)

Projection of the lateral orbital margin before mid-auricular plane	61
Projection of the malo-maxillary point	58
Projection of the nose	75
Projection of the ascending nasal process of maxilla	73
Projection of the lateral nasal margin	70
Projection of the nasion	69
Projection of the pre-auricular	71
Projection of the subnasal point	75
Projection of the upper alveolar point	78

Lower Jaw.

The lower Jaw (Pl. V, *d*, *e*) found at the *Guma Pahar* cemetery belongs to an old individual. It shows the presence of the right second molar only, which is also very much worn out. The process of absorption is marked in the lower jaw, specially on the left side. The socket of the second left molar is almost absorbed. The mental foramina have nearly approached the alveolar border. The lower jaw is characterized by the presence of prominent superior genial tubercles.

The following are the measurements of the lower jaw :—

Bicondylar breadth	.. ..	116
Bigonial breadth	.. ..	92
Leng. of the ramus	.. ..	50
Max. breadth of the ramus	.. ..	37

Min. breadth of the ramus	27
Symphyseal height	27
Mandibular length	57.5
Mandibular angle	132°

Indices

Mandibular Index	49.57
Ramus Index	54.0

The measurements of the right second molar are :—

Anteroposterior length	11
Transverse length	11

Scapula.

The left scapula (Pl. VI, *a,b*) was recovered from the *Guma Pahar* cemetery and belongs to an adult individual. The acromion process of the spine is missing and small portions of cancellous tissues are exposed at the inferior angle and at the terminus of the spinal axis upon the vertebral border in the supraspinous region. There is also a deep suprascapular notch in the scapula. The measurements of the scapula are as follows :—

Measurements

Morphological length (max. br.)	85
Morphological breadth (max. leng.)	118 ?
Spinal axis	86
Length of the supraspinous line	45 ?
Length of the infraspinous line	84 ?
Ant. post. diameter of the glenoid fossa (vert.)	32
Dorsoventral diameter of the glenoid fossa (trans.)	21
Length of the axillary border	116 ?

Angles

Spinal axis angle	101°
Infraspinous angle	86°
Vertebral border angle	94°
Axillospinal angle	47°

Indices

Scapular index	72.03 ?
Supraspinous index	48.14 ?
Infraspinous index	71.19 ?
Axillary index	98.31
Fossorial index	53.57
Glenoid index	65.63

Humerus.

The complete left humerus (Pl. VI) was found from the *Guma Pahar* cemetery while the other two bones (Pl. VI, *c,d*) with the epiphysis missing were recovered from the *Danowar* cemetery. All the three bones possess slight curvatures at the upper end of the shaft, which is marked in the left humerus of the two obtained from *Danowar*. The bones from the two cemeteries show some notable variations. The *Danowar* bones, as will be evident from the circumference measurements of the shafts, are stronger than that found from *Guma Pahar*. The *Guma Pahar* humerus is characterized by a long and deep bicipital groove and the muscular impressions can be very sharply distinguished from one another. The bicipital grooves in both the *Danowar* bones are flat and the shafts are rounded in appearance whereas it is somewhat triangular in the *Guma Pahar* specimen. The *Danowar* bones seem to be without doubt belonging to the right and left sides of the same individual.

The measurements of the humerii are given below :—

TABLE VII
Measurements

Measurements	Guma Pahar	Danowar	
	Left	Right	Left
Maximum length	271	..	..
Physiognomic length	274	..	..
Breadth of the prox. epiphysis ..	40	..	..
Breadth of the distal epiphysis ..	54	..	..
Longitudinal diameter of the head	40	..	..
Transverse diameter of the head	37	..	..
Circumference of the shaft at upper 3rd	50	60	59
Least circumference of the shaft	48	58	56
Circumference of the head ..	120	..	..
Indices			
Caliber index	17.20		
Index of the head	92.50	..	
Angles			
Torsion angle	144.5°	..	..
Cubital angle	79.0°	..	..

Radius and Ulna.

Only one radius (Pl. VI, *i*) of the right side and two ulnæ (Pl. VI, *f-h*), one right and one left, were found from the *Guma Pahar* cemetery whereas the shaft fragment of a right ulna was recovered from *Danowar*. The lower end of the right ulna from *Guma Pahar* is missing. All the bones are characterized by their curvatures in the shafts ; the ulnar curvatures being marked along the upper third of the bones.

The peculiarity of the ulna lies in the development of the interosseous border. In the *Danowar* specimen the ulna does not show the presence of any sharp crest but a triangular border is marked at the upper third of the shaft. In the *Guma Pahar* specimens the crests are prominent no doubt but they begin 67 mm. downwards from the lower lip of the radial notch in the right and 37 mm. downwards in that of the left side. The *Danowar* specimens are stouter and stronger than the *Guma Pahar* bones.

In the radius the interosseous border is also prominent ; the crest measures only 60 mm. long and begins 15 mm. below the tuberosity. The curvature of the bone is also a point of interest.

The measurements of the radius and the ulnæ are given below :—

Measurements of the Radius

Max. length	218
Physiological length	206
Least circumference of the distal half ..	30
Sagittal diam. of the shaft	10
Transverse diam. of the shaft ..	10
Ht. of the perpendicular on the greatest curvature of the shaft	6
Curvature index	4.06
Diaphyseal index	41.43
Curvature index	4.06
Angle	
Collo-diaphyseal angle	164°

Measurements of the Ulnæ

Measurements	Guma Pahar		Danowar
	Right	Left	Right
Max. length	..	231	..
Physiological length	..	207	..
Least circumference of diaphysis	28	29	38
Max. breadth of the olecranon cap	20	19	..
Ht. of the olecranon cap ..	2	3	..
Thickness of the olecranon cap ..	15	14	..
Indices			
Caliber index	..	14.03	..
Olecranon cap index	..	1.45	..
Curvature index	..	2.38	..
Angle			
Joint Axis Angle	..	81°	..

Pelvic Girdle.

The pelvic girdle (Pl. VII, *h*) comprising the two *os coxæ* and the sacrum (without the coccyx), was found from the *Guma Pahar* cemetery in an excellent state of preservation. The pelvis presents distinctive characters of the female sex and the two femora can be associated with it also.

That the pelvis belongs to a female is evident from the following facts : the articular surface of the sacrum does not extend more than two sacral vertebrae, the triangular obturator foramen, the presence of the pre-auricular sulcus, the everted ischial tuberosities, vertical ilia, the small acetabula and the shallow and wide ischiatic notches. The muscular impressions are not prominent. The feminine character of the bone is further borne out from the measurements* given below. The sacrum is short and wide. The upper part is flat while the lower

* In taking the measurements of the pelvis I have largely followed the methods of Turner (Challenger Reports, XVI, 1886).

end is bent inwards. The breadth of the sacrum is 98 mm. while the length is 97 mm. The sacral index is 101.03 while the coxal index is 76.51.

Measurements of the Pelvis (♀)

Measurements	*Guma Pahar*
A. External dimensions	
Breadth of the pelvis	231
Height of the pelvis	166
Br. between ant. sup. iliac spines	196
Br. between pos. sup. iliac spines	69
Br. between ischial tuberosities (outer) ..	131
Vert. dia. of the acetabulum	46
Trans. dia. of the acetabulum	44
Vert. dia. of the obturator for.	41
Trans. dia. of the obturator for.	32
Breadth height index	71.86
Obturator index	78.05
Subpubic angle	71°
B. Dimensions of the cavity of the true pelvis	
Trans. diameter of the brim	111
Conjugate diameter of the brim	103
Oblique diameter :—	
Right	111
Left	111
Inferior Sagittal diameter	92
Inter tuberal diameter	95
Depth of the pubic symphisis	30
Depth of the pelvic cavity	81
Pelvic index	92.79
C. Dimensions of the individual bones	
Length of the ilium	108
Breadth of the ilium	127
Br. of the innominate bone	144
Length of the os pubis	76
Length of the ischium	66
Iliac index	117.59
Pubic index	59.84
Ischiatic index	39.16
Innominate index (Turner)	86.75

Femur.

Of all the skeletal remains of the Mālér the femora (Pl. VIII) are the largest in number. In 1935 two femora were

found from *Danowar* and in the *Guma Pahar* cemetery three more complete femora and the lower half of another femur were found. The *Danowar* femora were described in an earlier publication. Their measurements and the other important features are also noted here for comparative purposes. For the sake of brevity the femora have been numbered as follows :—

A—Right and left, correlated with the pelvic girdle described above, *Guma Pahar*.

B—Right side, *Guma Pahar*.

C—Lower half of the right side, *Guma Pahar*.

D—Right and left from *Danowar*.

Femora A have been correlated with the pelvis because the head of the femora articulates very well in the acetabular cavity. The femur B appears to belong to a female also but the lighter colour of the bone and the sign of attrition present in the two extremities of the femur show that it has no relationship with the pelvis. The femur fragment numbered C appears to belong to a male. The *Danowar* femora have also been identified to be belonging to a female.

Of the female femora the *Danowar* bones appear to be stouter and stronger than the pair from *Guma Pahar* (A). The *Danowar* femora show the presence of a well-developed *crista aspera* whereas it is not so prominent in the *Guma Pahar* remains. The gluteal tuberosities are prominent in the *Guma Pahar* bones while the hypotrochanteric fossa is present in the form of a shallow area in both the two specimens. This hypotrochanteric fossa is very well marked in the B femur. The B femur, though belonging to a more slender individual than the *Danowar* one, agrees very much with the latter. The ridge-like formation in the texture of the *linea aspera* is almost identical ; the latter presents the highest pilastric index of 128.57. That the fragment of the femur, numbered C, appears to be of a male is evident from its wide popliteal surface, the well-developed lower part of the *crista aspera* with its prominent medial and lateral supracondylar lines and the deep, wide intercondylar notch and the bicondylar width.

The measurements of the femora are given as follows :—

TABLE VIII
Measurements

Measurements	A ♀ *Guma Pahar*		B ♀	C ♂	D ♀ *Danowar*	
	Rt.	Lt.	Rt.	Rt.	Lt.	Lt.
A. Length						
Absolute length ..	392	388	396	..	399	..
Physiological length	388	387	392	..	387	..
Trochanteric length ..	366	368	372	..	375	..
Diaphyseal length ..	330	331	338	..	362	369
B. Shaft						
Prox. dorso-ventral diameter ..	20	21	22	..	23	23
Prox. medio-lateral diameter ..	25	26.5	23	..	28	28
Medial dorso-vent. diameter	24	24	27	27	27	29
Medial medio-lateral diameter ..	22	22	21	23	26	26
Circumference of shaft	72	73	75	..	81	83
C. Proximal end						
Oblique proximal length	76	77	..	..	75	..
Leng. of head and neck	59	58	55	..	54	..
Vert. diameter of head	36	37	..	..	37	..
Trans. diameter of head	35	36	..	..	34	..
Circumference of head	114	115	..	..	112	..
Vert. diameter of neck	25	24	25	..	25	..
Trans. diameter of neck	23	23	22	..	29	..
Circumference of neck	78	77	75	..	86	..
D. Distal end						
Dorso-ventral diameter of the shaft just above the condyles	23	24	28	26	26	26
Medio-lateral diameter of the shaft just above the condyles	29	31	32	39	31	29
Greatest medio-lateral breadth across the epicondyles ..	66	64	..	69	48	..
Greatest dorso-ventral length of the lateral condyle ..	54	52	49	54	47	42.5

TABLE VIII—concld.

Measurements (concld.)

Measurements	A ♀ Guma		B ♀ Pahar	C ♂	D ♀ Danowar	
	Rt.	Lt.	Rt.	Rt.	Rt.	Lt.
Greatest dorso-ventral length of the medial condyle ..	49	48	..	56	53	..
Bicondylar width ..	66	65	..	72	56	..
E. Angles						
Collodiaphyseal angle	131°	130°	135°	..	125°	..
Condylodiaphyseal angle	100°	99°	98°	..	75°	..
Angle of torsion ..	32°	25.5°	28°	..	35°	..
Indices						
A. Caliber						
Length circumference index	18.56	18.86	19.13	..	20 96	..
Length diameter index	11.86	11.89	12.24	..	11.11	..
B. Shape						
Platymeric index ..	80.00	79.25	95.65	..	82.14	82.14
Pilastric index ..	109.09	109.09	128.57	..	103.85	111.54
Popliteal index ..	79.31	77.42	87.50	66.67	83.87	89.69
C. Indices of the proximal end						
Head index ..	97.22	97.30	..	..	91.89	..
Robusticity index ..	18.30	18.86	..	..	18.35	..
Neck length index ..	15.21	14.99	14.03	..	13.95	..
D. Indices of the distal end						
Epicondylar breadth index	17.01	16.49	..	..	12.40	..
Intercondylar index ..	90.74	92.31	..	103.71	112.77	..
Condylar length index	13.92	13.44	12.50	..	12.14	..

All the femora except B are platymeric, the average index being 80.88 ; the femur B with an index of 96.65 is eurymeric.

The subtrochanteric flattening is marked in the A femora and at this region both the femora present a slight curvature at the lateral side which is however not marked in any other femur belonging to this collection.

Tibia.

Altogether three tibiæ (Pl. IX) have been found from the *Gumar Pahar* cemetery, of which one pair appears to belong to one individual, while the third belongs to the left side of another individual. A right tibia was also found from *Danowar*, and this along with the left tibia found from the same place in 1935 and described before, completes the pair. As in the case of the femora, the tibiæ have also been similarly numbered. The pair of tibiæ belonging to the same individual, found from *Guma Pahar* has been numbered A, the singular left one from the same site B and the pair from *Danowar* C.

From the articular surfaces of the condyles of the two pairs of femora and tibiae from *Guma Pahar* one is tempted to associate the two pairs of bones to one individual. The tibiae from the two cemeteries show only minor differences. The *Danowar* bones are stronger than the *Guma Pahar* ones. The B tibia appears to belong to a young adult individual. The tibiae A is characterized by the presence of a well-developed soleal line—the upper end of which shows an oblique ridge-like formation along the medial border and is continued up to the middle of the shaft. In the *Danowar* bones it is moderately present and is continued only up to the level of the nutrient foramen.

The measurements of the tibiae are as follows :—

TABLE IX
Measurements

Measurements	A Guma Pahar		B	C Danowar	
	Rt.	Lt.	Lt.	Rt.	Lt.
Length					
Maximum length (sp-mall.)	333	332	..	..	339
Maximum length (cond-mall.)	332	330	..	..	336
Physiological length ..	316	315	326	..	321

TABLE IX

Measurements—concld.

Measurements	A Guma Pahar		B	C Danowar	
	Rt.	Lt.	Lt.	Rt.	Lt.
Shaft					
Dorso-ventral diameter (prox.)	36	36	34	40	39
Medio-lateral diameter (prox.)	25	25	22	26	23
Dorso-ventral diameter (med.)	28	28	30	32	32
Medio-lateral diameter (med.)	18.5	18	19	20	19
Dorso-ventral diameter (dist.)	24	26	26	28	28.5
Medio-lateral diameter (dist.)	18	18	17	19	19
Circumference of shaft (med.)	65	67	68	77	76
Least circumference of shaft	..	64	63	70	70
Prox. epiphyseal breadth ..	62	63	..	..	65
Sagittal diameter of dist. epiphy.	31	31	..	..	31
Angles					
Retroversion angle ..	10°	10°	..	..	20°
Inclination angle ..	5°	4°	..	..	14.5°
Indices					
Platycnemic index ..	66.07	64.29	63.33	62.50	59.38
Caliber index	..	19.28	..	..	20.65
Femoro-tibial index ..	84.95	85 57	..	..	

Fibula.

Two shaft fragments of the fibulæ (Pl. IX, *d*, *e*), one from *Danowar* and the other from *Guma Pahar*, were found. Shaft fragment of a fibula was also found from *Danowar* in 1935. The *Danowar* fibula is very much stronger than the *Guma Pahar* specimen. The *Danowar* specimen is exactly similar to that described in my earlier paper and similarly possesses a deep groove (Pl. VII, *g*) for the tibialis posterior muscle.

Astragalus.

The left astragalus (Pl. VII, *i*, *j*.) was found from the *Guma Pahar* cemetery. The bone shows only one peculiarity at its plantar aspect. The *sulcus tali* is very much narrowed down by the approaches of the posterior calcanear articular surface and the middle calcanear articular surface at its lateral border.

The measurements of the astragalus are as follows :—

Maximum length	49
Maximum breadth	36
Maximum height	26
Length of the trochlear	29
Breadth of the trochlear	22
Length of the head	23
Breadth of the head	18
Length of the post-ant. facet for calcaneous	31
Breadth of the post-ant. facet for calcaneous	19
Leng.-br. index	73.47

Affinities.

Due to the paucity in general of authentic skeletal remains belonging to the Indian aborigines and the fact that our present materials consist of only two skulls of each sex no far-reaching and definite conclusions regarding the racial affinities of this tribe can be made. Basu (1932-33, 1933-34) has described 7 Munda and 4 Oraon crania and his results are compared in Table X. A Vedda-Australoid strain has long been stressed in the aboriginal population of India and the Vedda measurements published by the Sarasin Brothers and other workers have, therefore, been utilized here for comparison. In Table X the measurements of the male Mālé skull are compared with the average figures of the Munda, Oraon and Vedda.

TABLE X

	Oraon (4 crania) ♂	Mālé (1 cranium) ♂	Munda (4 crania) ♂	Vedda (18 crania) ♂
Cranial length ..	182.75	167	179	180.2
Cranial breadth ..	130.5	121 ?	130	126.9
Nasion-inion length	174	148	167	..
Least fr. breadth ..	91 75	91.5	90.75	89.9
Greatest fr. breadth	113	111	109.25	107.5
Bimastoid breadth	99.5	99	99	..
Nasion-basion line	98.75	92	97	..
Sagittal cranial arc	370.75	344	365.5	362
Hor. circumference	507.5	462	501 5	..
Biauricular br. ..	116.5	104	112.5	..
Greatest occ. br. ..	104.5	96	104.5	
Cranial index ..	71.48	72.46	72.64	70.5

Mālé and Munda ♂.

As already stated, only a limited number of measurements could be taken on the male Mālé skull, owing to the complete absence of the facial region and the fragmentary nature of the skull cap. The male Mālé skull has a maximum cranial length of 167 mm. and a maximum cranial breadth of 121 mm. against the average cranial length and breadth respectively of 179 mm. and 130 mm. of the Munda skulls measured by Basu (1932-33). As is to be expected the Mālé cranium shows a nasion-inion length of only 148 mm. against 167 mm. of the Munda skull.

The difference in the size of the skull is still more clearly brought out when the sagittal cranial arc and the horizontal circumference are compared but the shape in both the Mālé and the Munda crania is closely similar as seen from the respective figures for the cranial index which are 72.46 and 72.64. The difference in size between the two series need not, however, be stressed as we have only one Mālé skull to judge from.

Mālé and Oraon ♂.

As compared with the Mālé, the average cranial length and breadth of the Oraon skull (Basu, 1933-34) are 182.75 mm. and 130.5 mm. respectively showing differences of 15.75 mm. and 9.5 mm. respectively from the Mālé skull. As is to be expected the nasion-inion length of 174 mm. in the Oraon crania is 26 mm. greater than the corresponding figure of 148 mm. in the Mālé skull. The larger size of the Oraon skull is further shown by the differences in the sagittal arc and the horizontal circumference which are 370.75 mm. and 507.5 mm. respectively in the Oraon against 344 mm. and 462 mm. in the Mālé. In cranial shape however, the two series are very similar ; the average cranial index being 72.46 in the Mālé against 71.48 in the Oraon.

Mālé and Vedda ♂

Compared with the Vedda averages of 180.2 mm. and 126.9 mm. for cranial length and breadth respectively, as given by the Sarasin Brothers (1892-93), the Mālé skull shows also lower values for the cranial measurements. The difference of 13.2 mm. in the cranial length between the Vedda and the Mālé closely follows the differences of 15.75 mm. and 12 mm. found respectively in the case of the Oraons and the Mundas. In head breadth the Mālé skull stands nearer to the Veddas than the Chota Nagpur tribes. The difference between the

Mālé and the Vedda head breadths is 5.9 mm., compared to 9.5 mm. and 9 mm. between it and the Oraon and the Munda respectively. The difference between the Mālé and the Vedda in sagittal cranial arc is 18 mm. compared with 26.75 mm. and 21 mm. respectively between it and the Oraons and the Mundas. As with the Mundas and the Oraons, the cranial index of the Mālé skull closely agrees with that of the Vedda. No significant racial difference can therefore be said to have been revealed between the Mālé and the other cranial series inspite of the undoubted smallness in the size of the former.

The paucity of identified skeletal materials for Indian aborigines is even more apparent in the case of female crania. I am not aware of any published measurements of Oraon female crania and we have available for purposes of comparison the only well-preserved Munda crania No. 607 of the Indian Museum collection, the measurements of which have already been published by Basu. There are also some figures on Vedda

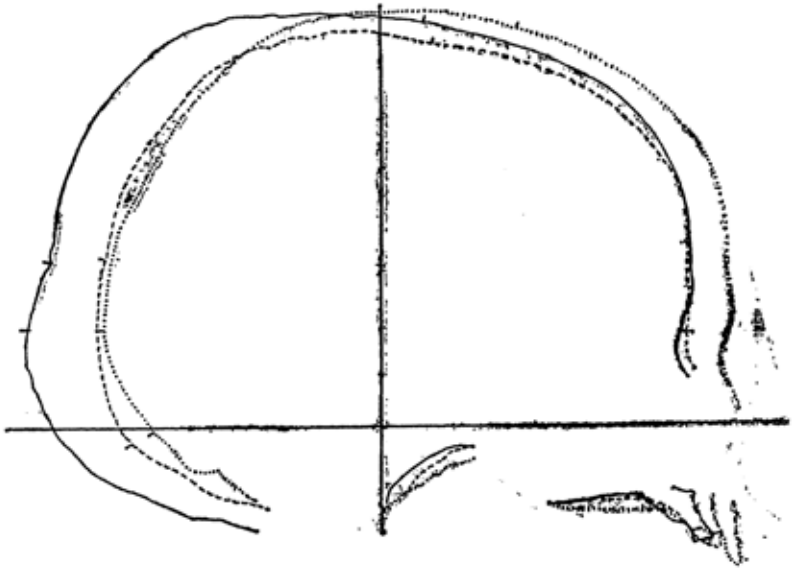

Fig. 15. Median sagittal craniograms of ♀
———Vedda (Sarasins),- - - - -Mālé. . . . . Munda crania × ½

female crania published by the Sarasin Brothers. In Fig. 15 are transposed the median sagittal craniograms of the female Mālé skull, the female Vedda skull taken from the craniogram

published by the Sarasins (Pl. LXIX, Fig. 134) and the female Munda skull mentioned above. It will be seen from this that the Mālé cranium is the smallest of the three. While the Munda skull is remarkable for its forward growth, the posterior parts are best developed in the Vedda skull. The Mālé skull agrees very closely in the shape of the frontal part with that of the Vedda but differs widely in the occipital region. In the latter part, it however, agrees fairly closely with the Munda skull, but not in its forward projection of the whole frontal and facial parts. There is also some agreement between the Mālé and the Vedda skulls in the conformation of the nasal parts.

In the absence of any comprehensive female cranial data I have undertaken here a comparison of the three individual crania mentioned in Fig. 15.

Mālé and Vedda ♀.

The female Mālé cranium with a cranial index of 79.62 (cranial leng. 157 mm. ; cranial br. 125 mm.) shows a tendency towards brachycrany while the Vedda skull with an index of 68.7 (cranial leng. 179 mm. ; cranial br. 123 mm.) is distinctly dolichocranial. The difference between the two crania is more marked in the length (22 mm.) than that in the breadth (2 mm.). In auricular height also the difference is marked, the respective figures being 126.5 mm. and 105 mm. in the two skulls. The Sarasins took only a limited number of measurements which is reproduced in Table X. Of these the sagittal cranial arc of the Vedda skull is found to be 367 mm. as against 330 mm. of the Mālé skull.

In the built of the nose, however, there is a close coincidence. The nasal length is 41.4 mm. in the Vedda as against 41 mm. in the Mālé, while nasal breadths of the Vedda and the Mālé are 23.75 mm. and 25 mm. respectively. The nasal indices calculated from the above figures are 57.2 for the Vedda as against 60.98 in the Mālé. The two crania thus agree with one another in the form of the nose.

Mālé and Munda ♀

The single female Munda skull available for comparison is dolichocranial having a cranial index of 67.88 (cranial leng. 165 mm. ; cranial br. 112 mm.)* as against 79.62 of the Mālé

*The cranial breadth of the other broken female Munda skull No. 611 belonging to the Indian Museum collection is, according to Basu, 123 mm., thus agreeing closely with the cranial breadth of the Mālé skull (125 mm.).

(cranial leng. 157 mm. ; cranial br. 125 mm.). The relation between the lengths and breadths of the two crania is just the reverse of what we found between the Mālé and the Vedda. In the present case the difference in cranial length is only 8 mm. compared with that of 22 mm. found between the Mālé and the Vedda. In cranial breadth the difference between the Mālé and the Munda is 13 mm. as against 2 mm. between the Mālé and the Vedda. There is a remarkable coincidence in nasion-inion length which is 148 mm. in both the crania. In the measurements, the two skulls are not very much widely differentiated except in the transverse cranial arc which is 283 mm. in the Mālé as against 268 mm. in the Munda. The horizontal circumference is 455 mm. in both the crania while the sagittal arc shows only a difference of 5 mm., the value being 330 mm. in the Mālé as against 335 mm. of the Munda. The frontal arc of the Mālé skull is 120 mm. compared with 113 mm. of the Munda, while the parietal arc is 117 mm. in the former as against 120 mm. of the latter. The occipital arc measurements show somewhat greater variation than the other arc measurements. It is 93 mm. in the Mālé as against 102 mm. in the Munda. Thus we find that though the two crania agree in many respects there are striking differences in the form and shape of the skull.

As in the case of the Vedda skull the form of the nose in both the crania is very much similar. Both the skulls have the nasal breadth of 25 mm. while the nasal length is 41 mm. in the Mālé as against 42 mm. in the Munda. The nasal indices are 60.98 and 59.52 in the Mālé and the Munda respectively.

Coming to the angle measurements of the craniograms of the two crania, the largest differences are met with in the inclination angle of the frontal bone, this being 60° in the Mālé as against 65° in the Munda. This is well supported by the curvature angle of the frontal bone which is 130° in the Mālé as compared with 125° in the Munda. The parietal curvature angle is also greater in the Munda (135°) than that of the Mālé (127°). The facial profile angle is 84° in the Munda compared with 80° of the Mālé. The calvarial base angle is 10° in both the crania.

We thus find that the two crania agree with one another in a larger number of characters though they differ in their general shape and form. These differences are mostly due to the marked forward growth of the Munda skull. This becomes clear from the meatal position indices of the two crania.

the Munda skull has a meatal position index of 53.70, according to Basu, as against 57.14 of the Mālé skull.

Arising out of the above analyses there are some points which require special mention, e.g. the low cranial capacity of the Mālé skull, which is 970 c.c. only. Thomson (1890) has recorded the cranial capacity of 960 c.c. in a female Vedda skull whereas the Sarasins found the lowest capacity of 990 c.c. in the skull of a fifteen year old Vedda girl whose cranial dimensions are larger than those of the Mālé skull. The cranial length of the above-mentioned skull, according to the Sarasins, is 171 mm. and the breadth 112 mm., giving an index of 65.5. Thomson has given the cranial index of the Vedda skull, mentioned above, as 69.9, with a cranial length of 166 mm. and breadth of 116 mm. Among the aborigines of India, Martin (1928) has referred to the occurrence of low cranial capacities, such as 950 c.c. and 970 c.c. among the Andamanese and the Kurumbars but this statement could not be verified. Flower (1884) has given the lowest cranial capacity for the Andamanese males to be 1,120 c.c. and that for females as 1,040 c.c. In his earlier paper Flower (1879) found the minimum cranial capacity in an Andamanese female skull to be 1,025 c.c.

Anthropologists have not paid so much attention on other parts of the skeleton as they have to the skull and it may be partly due to the fact that racial values have not been so definitely demonstrated on them. Eugen Fischer, however, as early as 1906, in his famous paper on the variations of radius and ulna, urged the necessity of monographic treatment of every individual bone of the human skeleton. In the preceding pages it has been my object to show the variations in the respective bones and below a small note on the racial variations of the scapula and pelvis has been appended.

The scapular index and the infraspinous index as a racial character were first pointed out by Broca (1878) and then by Flower and Garson (1879). The scapular index of the single Mālé scapula very nearly approaches the Negroes. This is 72.03 in the former as compared with 68.16 (Broca), 71.7 (Flower and Garson) and 69.7 (Turner) for the Negroes. Turner (1886) has found the highest scapular index of 70.2 among the Andamanese from a study of 27 scapulæ. On the other hand, the low infraspinous index of the Mālé scapula is remarkable. In this case the two scapular indices are found to be almost equal which may be peculiar to this individual, otherwise it has

been known that the infraspinous index is always much higher than the scapular index. Martin (1928) has drawn attention to the fact that the scapular measurements are subject to changes due to the working of the muscles in this region though he remarks the differences between the European and the Negro averages of the above two indices as *'ein immerhin beachtenswerter Unterschied'*. He lays somewhat more stress on the infraspinous index than the scapular index. With regard to the latter, Martin believes that there can be hardly any racial difference as the bone is subject to two *'heterogene momente'*, one due to the broadening of the scapular plate and the other due to the bending of the spine.

The pelvic index of the Mālé female pelvis is 92.79 and the sacral index is 101.03. According to Turner's classification this pelvis falls into the mesatipellic group, which according to him includes the Negroes, Tasmanians, New Caledonians, and Melanesians (?), while the sacrum in the platyhieric group. The platyhieric group includes the Negroes, the Europeans, and the Hindus.

The pelvis of the female Vedda, whose cranium has been compared before together with the median sagittal craniogram given in Fig. 14 and the cranial measurements in Table V, has, according to the Sarasins, a pelvic index of 95.8 and a breadth-height index of 86 compared with 92.79 and 71.86 respectively of the Mālé. The Sarasins have given the mean pelvic index of 88.2 for the Vedda female, derived from the measurements of 3 individuals while the mean breadth-height index for the same is 78.3.

It will be difficult to say from such meagre data whether the peculiarities of the Mālér skeletal remains are racial or only individual characters. The present data will be useful to future workers, who may be fortunate to come across more material, for comparative purposes.

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CHAPTER IV

THE NEGRITO RACIAL STRAIN IN INDIA

The question of the Negrito racial strain in India has been raised since the latter part of the 19th century, but unfortunately research on the question seems to have been inadequate. What little there is, goes to the credit of Dr. B. S. Guha (1928, 1929). His work has been chiefly anthropometric ; but much of his basic data remains unpublished.* While so little is really known on the Negrito question in our country, it is unfortunate that the existence of the Negrito strain is being propagated in recent official vernacular publications as a settled fact.

Before Australia was well known anthropologically, Topinard believed that there were woolly-haired peoples among the Australian aborigines and De Quatrefages also held the same view. As we trace the history of the Negrito racial element in this country we find that it was in De Quatrefages that the above hypothesis had its origin as early as 1877.

Earlier sporadic references

Since the first assumption of an autochthonous Negrito element at the 'substratum of the Dravidian and other populations in India and along the southern slopes of the Himalayas' by De Quatrefages in 1877, there have been from time to time references to sporadic cases of frizzly or woolly hair in this country. All these were summarized by Keane (1896) in his *Ethnology*, and it will be worthwhile to represent the then differences of opinion in the form of a table. It is interesting to record here the opinion of V. Ball, as early as 1895, when he referred to the 'worthless nature of the evidence relied on by De Quatrafages'. It is also remarkable that all of them,

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*Guha in the Census Report, 1931, I, Pt. III (1935) has not published any details of the Kadar anthropometric data although values of Co-efficient of Racial Likeness were calculated on them. In his 1929 note in *Nature*, he mentioned having measured 157 men and women, while in the Census Report (p. xlviii) he 'measured over 112 males and 31 females'. The Kadar population in 1931 consisted altogether of 267 souls.

including Guha in recent years, have attempted to prove the presence of a racial strain from the solitary character of the hair form alone.

For Negrito	Against Negrito
De Quatrefages (1877) first proposed on the basis of some 'mopheaded' Veddas of Ceylon photographed by Mon. de la Croix. James Dallas (1885) George Campbell	E. Callamand (1878) F. Jagor & G. Koerbin (1887) V. Ball (1895)

In 1909, Keane expressed his doubts in the following words : 'But it may be doubted whether any woolly hair, such as is common to all known African and Oceanic Negritos has yet been seen in India proper'. During the years 1903-04, Lapicque carried out a survey among the Kadars and suggested the existence of a primitive Negrito race. His findings were published by him in 1905. In 1906, however, he modified his views and stated that he did not find a Negrito group similar to the Andamanese but only a bastard population. The relevant portion of his writings was quoted in this country by Thurston (1909) in his Introduction to Vol. I of the *Tribes and Castes of Southern India,* but was apparently not known to Dr. Guha who only came to learn about Lapicque's researches during his stay in Paris (p. 1) when he only came across Lapicque's earlier view of 1905. It is worthwhile giving here an English rendering of Lapicque's views as quoted by Thurston :

'In the mountains of Nilghirry and of Anemale, situated in the heart of the Dravidian country, have been noticed since a long time ago, short woolly-haired savages, whom one may consider, on the insufficient records available, as being Negritos. In reality, there is not in these mountains, nor probably in any other part of India, any evidence of a primitive race comparable in purity to the Andamanese or to other Negritos. What one finds there is simply,—but it is very precious,—a cross-bred population which continues up to the Parias of the general series of India. In the fringes of virgin forests, or in the hills partly cleared, there are half-savage demi-Paria castes. They rank below Paria in the social hierarchy. It is possible also to find groups in which characteristically Negro facial aspect is definitely predominant. In these groups the hair is usually

frizzly and a few have hair which may even be called woolly. One has then the means of prolonging in imagination the series of Indian castes upto a primitive type which formerly existed (we have only one step to take to reconstruct it). We have thus arrived at reconstruction of Negro traits of a type which has disappeared, by prolonging a series of mixed population. By the same method we can determine theoretically the form of the skull of this type. With a sufficiently large degree of certainty I can affiirm, after numerous systematic measurements, that the primitive Negro of India was sub-dolichocephalic with an index of about 75 or 76. His stature, more difficult to define precisely because the conditions of life modify this character, might be small, higher than that of the Andamanese. As regards the name which should be given to this type, the discussion of social and linguistic facts on which is founded the Dravidian notion, enable us to establish that this Negro was anterior to Dravidians. He should be called Pre-Dravidian or if one wishes to give a name not linking him up with another people, one can call him Negro-Paria.'*

In the meantime, the Sarasin brothers completed their monumental work on the Veddas of Ceylon (1893) and they denied the presence of any woolly hair in India. Turner's (1905) craniological studies also led him to a similar conclusion. Thurston also denied the presence of any woolly hair in South India.

Keane, who formed the opinion given above in 1896, became an ardent supporter of the Negrito 'substratum' sponsored by De Quatrefages. Apart from his other writings, Keane (1909) utilized the opportunity of pressing home the Negrito theory in an Indian publication and that in which the Kadars appeared first of all, namely, in his Introduction to L. K. A. Iyer's *The Cochin Castes and Tribes*, Vol. I. He suggested in chronological order the arrival of the various races in India. Of these 'a submerged *Negrito* probably from Malayasia' were the first to arrive. He also identified the Veddas of Ceylon, the Paniyans of Wynad, the Kadars and Malsars of Coimbatore and Cochin, the Kurumbas and Irulas of the Nilgiris, the Malayalis, Pallis, Shanars, Katumaratis of Salem district, the Vellalas of Madura as possessing Negroid traits.

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*I am thankful to Prof. K. P. Chattopadhyay for the English translation.

Risley (1915) denied the presence of any woolly hair in India. Haddon (1924) reduced the long list of Keane, referred to above, into one, namely the Kadar ; but he had his own doubts about the correctness of the Negrito origin. There is no mention of it in his revision of Keane's *Man : Past and Present* (1920). Dudley Buxton (1925) also has not been able to agree with the evidence of a Negrito racial strain in Central and Southern India. Howells (1937), who subjected Risley's anthropometric data to morphological analysis, writes : 'For specific examples may be taken the Paniyan and Kadir tribes. . . . The one fact which weighs most strongly against the belief that the jungle people are of Negritoid origin (though not so much against a Semang or Sakai connection) is their general dolichocephaly'. Hutton (1927) attempted to substantiate on physical, cultural and traditional grounds a Negrito substratum in the population of Assam. In 1928 and 1929, Guha again raised the question of Negrito racial strain in India, which, since the days of De Quatrefages, had been finding more opponents than supporters. We will discuss these recent cases in somewhat greater detail.

In recent years, von Eickstedt has raised more than once a protest against the Negrito racial strain and it is rather surprising that his writings have been consistently ignored by official anthropologists in India, who generally avoid discussion with those who disagree with them. Eickstedt (1939) in his Introduction to L. A. K. Iyer's Volume II of the *Travancore Castes and Tribes* has very ably traced the historical background of India's racial history and the anthropological nomenclature. Eickstedt's analysis shows the manner in which Lapicque has been quoted (also by Guha) both against and for the Negrito theory. His conclusions are worthwhile quoting : 'Genuine Negro frizzly hair therefore naturally never has been found in South India, but spiral hair, the relation of which to the hair forms of other contact races like the Melanesids has already been pointed out in 1929 by the author. The problem probably could only arise because the distinguishing words, spiral, woolly or frizzly, had been applied in a vague manner'.

Recent sporadic references

Among recent observations, the first reference to Negrito woolly and frizzly hair is that of Hutton from among the Nagas of Assam. He has however recently contradicted (1946) the generalized statement of Guha who ascribed the majority of this

character to the Angami Nagas alone. Hutton published only two photographs, which are however not very clear, and the hair form alone was his sole physical criterion. It is always desirable in such cases to take out a bunch of hair from the head and photograph it separately. Martin (1928) has shown the method and in controversial questions such a method of representation is extremely desirable.

The next references to woolly and frizzly hair are from Guha. In his case as well, the photographs published in *Nature* are not clear enough to demonstrate the 'pure woolly' nature of the hair. Apparently, Guha changed his observation regarding woolly hair subsequently, as there is no mention of any woolly hair in his 1935 report, although in his 1929 note in *Nature* he wrote : 'Of the short woolly-haired type I am not so certain'. The photographs, published in his 1935 report, however show the frizzly hair of two Kadars. There is a slight discrepancy in his statement also. In his 1929 communication in *Nature* he mentions 16 individuals with Negrito hair form, whereas in his 1935 report he mentions 15 cases instead. The detailed anthropometric study of these people, promised by him in *Nature* (1929), has not yet appeared and one wonders how a controversial question of such primary importance can be left unattended to for nearly quarter of a century. He, however, has been eloquent in upholding the Negrito substratum, as Keane did towards the early part of the century. There have been several publications by Guha, both in English and the vernaculars, where nothing more than the opinions expressed in the 1928-29 issues of *Nature* have been repeated. Under these circumstances, the Negrito racial strain, so often claimed by Guha, still remains to be established scientifically. Sir Arthur Keith's view is worth quoting in this connection. In his review of Guha's findings (1936) he said : '(5) A type which differs from the last only in its small make of body and in its tendency to have the hair spirally curled. The type is best seen amongst the Kadars and Pulayans of the South. This is but a variant of Type 4 ; every stage between the two occurs.'

Type 4 mentioned above is akin to the Veddas and predominates among the tribes of central Southern India.

The last of the recent references to Negrito hair is that of the present writer (1936). My own case too suffers from defects similar to those mentioned above, for an isolated characteristic as such does not yield any evidence of a racial

strain. I had never the opportunity of correcting myself and I was only aware of the shortcomings of my paper when I came under Prof. Eugen Fischer in 1938-39.

Apart from the hair characters mentioned above, Cipriani (1938), in a brief abstract, the details of which have not so far appeared in English, mentioned 'Negroid features' among Toda women. This is a singular observation in the face of the many works on the Todas by eminent scientists, who, as far as the present writer's knowledge goes, have never referred to any such Negroid association.

Keith (1948) in his recent work has simply referred to the so-called Negrito strain in India as "interesting exceptions", while Schebesta (1952), a most famous authority on the Negritos, has advised further researches before both Hutton and Guha can be accepted.

In presenting the sporadic cases of frizzly or woolly hair, all the authors have completely ignored Eugen Fischer's work entitled *Die gegenseitige Stellung der Menschenrassen auf Grund der mendelnden Merkmale,* published in 1932 ; otherwise some factual data in support of the mutational hypothesis of Fischer might have been found. Fischer postulated the mutation of woolly hair from the wavy hair of the Veddas and there were at least three such independent mutations in the Australoid stem according to him. Rita Hauschild (1939) has shown the difference in the genetic behaviour of the Negro curly or frizzly hair in contrast to the ordinary curly or frizzly hair in her studies of Negro-Chinese, Negro-Indian and Chinese-Mestizo crosses in the West Indies and is of opinion that the above phenotypically similar hair forms have independent phylogenetic origins. This observation all the more supports Fischer's earlier hypothesis of independent genetic origin of the curly or frizzly haired peoples of Africa and the Melanesian Islands. As such, further researches on the heredity of the frizzly or curly hair form, sporadically met with in this country can only solve the present question. Whether it is another independent mutation, only further researches can show. Mohr (1932) has shown the mutation of such a woolly hair in a Norwegian family free from any Negro strain and none will dare speak of a Negro strain in Norway.

Till such an enquiry is carried out, the Negrito racial strain —on the basis of the hair form alone—cannot be so eloquently

asserted, as it is apparently being done now. Much has already been said on the extreme meagreness of the data. Nothing is known of the familial relationship of Guha's 15 or 16 Kadars showing the so-called Negrito type of hair. If these individuals happen to be related, Guha's frequency of Negrito of about 10% will be much less. The Kadar population of 267 souls only in 1931 warrants a close familial relationship in the sample.

The Kadars have been the subject of a recent ethnographic study by Ehrenfels (1952) who appears to have been highly impressed by Guha's opinion about the hair form of the Kadars. Ehrenfels has indulged in the most sweeping generalizations on the Kadar hair form. On page 24, he has mentioned the woolly character of the hair of the Kadar women in a most generalized manner. In Plate VII/C mention has been made of 'kinky' hair in a boy having parents with curly hair, although it is apparent from the photograph in the father only. The same parents have been described on page 95, where the father's head hair is mentioned as 'frizzy, almost woolly' while on page 99, the mother is described as having woolly hair. The author has used the terms curly, frizzly and woolly in an extremely loose manner and the reader finds himself in difficulty with regard to the real hair form in the extremely indistinct photographs. The author has also indulged in certain remarks on Negritoid features as contrasted with Proto-Australoid features on grounds which are equally vague. So little is known of the somatic characters of the Kadars, excepting those published by Thurston, who denied the presence of any Negrito strain, that it is very hazardous to speak of any racial affiliation. Both Guha and Ehrenfels have worked among the Kadars of Perambiculam and the many illustrations of the latter, indistinct though they are, do not appear to show a frequency of about 10% of frizzly hair as claimed by Guha. Out of about 50 illustrations given by Ehrenfels only one appears to show a certain amount of frizzled hair, and that too is doubtful from the photograph.

Skeletal Remains

No authentic skeletal remains of the Negrito race have yet been found in India although Guha has cited two such instances. We will examine here how far this evidence is satisfactory.

In his 1935 report, Guha supported Hutton's findings about the Negrito substratum in Assam with his own findings of a Negroid element in the Naga human relics (Guha & Basu,

1931). The latter authors found two racial types among the Naga human relics which were called Group I and Group II. Group I was Mongoloid while Group II has been called Proto-Australoid or Australoid (pp. 16, 19). On page 16, the latter group has also been described as approaching the Mohenjodaro skulls of the Proto-Australoid type 'in the great depth of the subglabellar notch'. This clear Australoid type, which the authors acknowledge more than once, has not been compared with any Australian skull but has been compared with Tasmanian and Melanesian crania, probably on the basis of 'close cultural affinities between the Naga Hills and Oceania, specially Melanesia' (p. 21). But how can Australia be excluded for Australoids ? On the concluding page (26) of their report, the authors' remarks are as follows : 'As a result of these comparisons the Group II of the crania agrees with both the Melanesian and Tasmanian skulls in the formation of the lower forehead and nasal root, showing undoubted "Australoid" characters in these respects'. Just a few sentences after this, we find : 'Taking everything into consideration it seems not unreasonable to assume that the Negroid element, as revealed in the Papuan and Tasmanian skulls, was fairly extensive at one time in India from the North-East Frontiers to the South-Western extremities and that this element must have been driven into Oceania by later movements of people—persisting only in a few isolated tracts to which these movements had not penetrated'. Let the readers judge what they can from the above quotations and here the authors have tacitly assumed that the total number of 6 male skulls of Group II in comparison with the 55 male and 24 female skulls of Group I belonged to the N. E. Frontier and that they cannot come from outsiders or foreigners, inspite of their remarks on page 3.

Further, the authors have not differentiated between Papuan and Melanesian racial characters at all. Though comparison with Papuan skulls were in view, the authors have by-passed Dorsey's (1913) data with a brief mention and actual comparison of the composite facial profiles has been made with New Caledonian skulls. The selection of the four dolicocephalic crania for the above purpose is not without objection. Sarasin found about 30% brachycephaly in New Caledonia, though the mean cephalic index is 76.5.

Guha has taken the opportunity of repeating his discovery of frizzly hair in Cochin just prior to the second quotation given

above. Since he has raised the question of hair form here, one is reminded of Melanesia possessing all hair forms—wavy, frizzly and woolly—and the four selected New Caledonian crania might have had any hair form. It will be evident from the above details that his first reference to 'the presence of a definite Negrito strain' is probably Australoid and not a Negroid one.

Guha has, in the second instance, (1947) ascribed the Jewurgi skull, discovered and published in the form of a drawing only by Meadows Taylor (1873), as 'showing pronounced Negroid characteristics'. Taylor has offered no data excepting the tradition of a race of dwarfs and the mere drawing *in situ*. Guha has not mentioned anything of the Negroid characteristics. The skull appears to have undergone some amount of deformation, as seen in the flat occiput, incurved from about the region of the parietal tuberosity, which may be artificial or pathological or may be due to the pressure of the superimposed structures. Nothing can be made out of the facial region above the alveolus. It is thus difficult to assign this skull to any racial type from such meagre data.

Origin of Pygmy Forms or Dwarfism

The Negrito problem has in recent years been the subject of intensive studies by Gates (1948), Gusinde (1948) and Schebesta (Fischer, 1953). The two last-named authors have spent a large part of their lifetime among the pygmies of Belgian Congo and as such, much is now known of the pygmies. The presence of the Andamanese pygmoids in their present habitat has not yet been satisfactorily explained. Radcliffe-Brown (1922) held that the Andamans 'were peopled, either by sea or by land, from the region of Lower Burma." Recent oceanographic researches can satisfactorily explain the presence of the Andamanese in their present habitat. In discussing the question of migration in an insular area the sea-faring tendencies of the people concerned are probably the primary criterion. An example of it can be afforded from the Mergui Archipelago,* the population of which comprised such sea-faring peoples, popularly known as 'Sea-gypsies'.

Speiser (Fischer, 1953) from his studies among the pygmies of New Hebrides came to a decisive conclusion that there is

*Haetinger (1942) has found a strong Veddid and Malayan element among the Mawken of the Mergui Archipelago.

nothing like a pygmy race. He showed that the tall coastal peoples and the pygmy mountainous inland peoples are varieties of the same race. He ascribed the pygmy formation to environmental factors. He also pointed out that pygmies in other parts of the world do not either belong to the same race or to the branches of an older racial stock. Fischer (1950) also supported the above views of Speiser in the following terms : 'Niemals bilden also etwa die Pygmaen zusammen eine Rasse, nor war das in der Vergangenheit der Fall'. In his recent review of Schebesta's work Fischer has emphasized : 'Ich glaube als Genetiker, dass in jeder Rasse durch Mutation Kleinwuchs, Pygmaenwuchs oder Grosswuchs entstehen konnen'. Gates (1948) also contends that 'dwarfism in mankind, like gigantism in birds, thus appears to have arisen many times independently'.

This view stands in sharp contrast with the current anthropological idea of a common inter-relationship of the pygmies in different parts of the globe. Fischer (1950) has shown three ways of pygmy formation :

(*a*) Due to the direct influence of environment (nutrition and other factors), retardation in growth may take place. Such influences are neither racial nor hereditary but are only local modifications, as in the case of Speiser's New Hebrides pygmies.

(*b*) Through the long-standing process of selection, due to malnutrition, climatic and other influences, the taller hereditary lines out of a medium or tall population can be more and more reduced and lastly eliminated. At the same time other individualities may also develop. Fischer is of opinion that this process is involved in many of the pygmoids, e.g., the Veddas, and probably the Laplanders. Such individuals constitute a race.

(*c*) Through mutation in normal populations, which concern genes other than those related to the process of selection, as in (*b*) above, namely, the basic gene for growth. These mutations are eventually selected and the non-mutated statures are eliminated. The origin of these mutations is proved subsequently through crosses and also from the parallel pygmy mutations in European populations.

In arriving at the above conclusions Fischer greatly depended on the various earlier authors, specially Hanhart (1925) who found in certain inbred districts of Switzerland and in the island of Veglia in the Adriatic Sea, a number of pygmy forms

(midgets). Hanhart's dwarf cases were mostly adiposo-genital dystrophics ; they were born normal but growth disturbances set in between the second and third year of life. Gusinde, at the request of Fischer, observed among the Bambuti pygmies of Belgian Congo that the new-born pygmy babies are not born with a pygmy appearance ; they are hardly 3 cm. shorter than the European new born babies. It thus appears that disturbances in growth in early life are one of the chief causes of dwarfing.

Associated with the above growth disturbances, Fischer has also drawn attention to Staffe's researches on acclimatization and its relation to the formation of the pygmies. Staffe after his long stay in the Kameruns has shown that tropical Africa not only shows pygmy man but also many types of pygmy animals—pygmy elephant, pygmy antelope, pygmy hippopotamus, pigmy pigeon, pigmy grebe ; so to say, a pigmy fauna. To this may be added the pygmy chimpanzee (*Pan paniscus*) from the south of the Congo River (Coolidge, 1933). Staffe has combined the whole phenomenon under one common cause. The animal diseases in South Africa have their origin in photosynthesis due to the main role of haematoporphyrin in the highly ferruginous soil of Africa. The iron content of food and drink causes the increase of porphyrin and haematoporphyrin in the body which undergoes photosynthesis due to the strong sun-light and lets loose the process of mutation. Fischer fully supports Staffe's hypothesis and has adduced further proof of pygmy fauna in the ferruginous soil of southern New Caledonia after the findings of Fritz Sarasin.* Gates (1948) in his *Human Ancestry* has discussed at length the problem of dwarf races and is of opinion : 'it seems probable that they represent mutational dwarf derivatives of different races and not (except perhaps the Bushmen) survivors from an early ancestral stage of man'.

The Negritos of the Andaman Islands

With the above process of pygmy formation before us, let us see how far the above conditions apply in the case of the

*Only two mammals are found wild in the Andaman jungles of which *Sus andamanensis*, at least in size, appears to be a pygmy variety of *Sus crofa*. Of the animals imported in recent times the dog only has been domesticated by all the aborigines, excepting the Jarawas. Whether the imported animals have undergone any change is not known.

Andaman Islands. Nothing is known of the growth phenomenon of the Andamanese. An attempt, however, has been made to find out disturbances in growth, if any, from a comparative study of the height and weight measurements of the Andamanese and a few other aboriginal tribes of India. Man (1883) has published the original data of 40 male Andamanese and 37 female Andamanese which have been compared with similar data from Santal Parganas (Mitra, 1940).

TABLE XI

Andamanese Height and Weight Compared.

		Height (in)			Weight (lbs.)		
		Max.	Min.	Av.	Max.	Min.	Av.
Andamanese	Male (40)	64.25	53.75	58.91	119.5	77.5	97.50
	Female (37)	59.50	52.00	55.17	127.0	67.0	93.20
Santal	Male (113)	--	—	62.71	—	—	99.03
	Female (178)	—	—	58.39	—	—	87.02
Malé	Male (69)	—	—	61.51	—	—	90.98
	Female (35)	—	—	57.07	—	—	77.07

TABLE XII

Analysis of Andamanese Stature.

	Male (40)		Female (37)	
	No.	%	No.	%
V. Short	26	65.0	23	62.16
Short	13	32.5	14	37.84
Medium	1	2.5	—	—

It will be seen from Table XI that while the male Andamanese are shorter and lighter than the male Santals, the female

Andamanese are much heavier than the female Santals inspite of the shorter stature of the former. Compared with the Mālé both the Andamanese sexes are much heavier, though the former possesses higher statures ; the difference of 16.13 lbs. in the weight of the females particularly, being more marked than that between the Santals and the Andamanese. If the difference of 1.53 lbs between the weights of the male Santal and Andamanese is ignored, it can be said that the Andamanese standards of height and weight are superior to those of both the Santal and the Mālé, and the Andamanese females excel in this category. The Andamanese heights have remained highly constant, as will be evident from Eickstedt's (1931) figures. He found the mean heights of 10 male and 22 female Andamanese to be 58.72 inches and 55.40 inches respectively as compared with 59.24 inches and 55.36 inches respectively for 42 male and 38 female Onges of Little Andaman.

In whatsoever manner the differences in the weights of the above three peoples are interpreted, as being due to nutritional differences or other factors, the highest weight of the Andamanese females may, to a certain extent, be due to the excessive accumulation of fat on the gluteal region, known as steatopygia. The steatopygia of the Andaman Negritos has not been so commonly described as those of the Bushmen, Hottentot and other African peoples. Gates (1946, 1948) has also discussed at length the question of steatopygia. He has shown evidences of steatopygia during the palaeolithic times as evidenced in drawings and cultural relics and also among the Caucasians. According to him, it arises among the latter 'as a pathological condition arising from endocrine derangement'. He also regards it 'as an expression of constitutional infantilism in posture and in fat distribution. The pelvis is also more anthropoid than in any other living race and the sacrum is sometimes very simian'. In arriving at this opinion, Gates has utilized Drury and Drennan's studies on the pudendal parts of the Bushmen. Drennan has also suggested that the pygmy form and the steatopygia are due to glandular adjustment to the desert environment and the latter is a 'method of storing fat for the emergency of rearing children through drought' ; but Gates has rightly pointed out that the higher aridity of Central Australia has not produced the same character in the Australian aboriginal women. It appears however, from Gates' survey that infiantilism, steatopygia and the pygmy stature are somewhat closely associated. Even the dwarfs of Okinawa show a tendency

to steatopygia. Endocrines have been found to be responsible for the various kinds of dwarfism and they have played their role not only in the deserts and jungles of Africa but also in the modern cities and in the insular regions of Veglia, Okinawa and the Andamans. The genetic behaviour of steatopygia is not fully known, but because of its association with the endocrines it is not unlikely to presume that it has some influence on the reproductive physiology. Hanhart's dwarfs were sterile and so also is the case with the majority of the infantile ones. The Andamanese of the Great Andaman are nearly extinct and Man (1882) commented on the 'limited fecundity of the women' to be one of the factors of the decaying population before any significant contact with civilization. This will be also apparent from Table XIII where the reproductive lives of 100 Andamanese women have been analysed from the original data of Portman. The North Andaman data were collected in June 1893 and the South Andaman data in June 1894. The number of unproductive marriages is high in both the regions, and the ages of the above groups are given in Table XIV.

TABLE XIII

Reproductive Lives of Andamanese Women

	North Andamanese				South Andamanese			
No. of Women	50				50			
Less Unmarried	4				1			
	46				49			
Unproductive Marriages	21				17			
	25				32			
	L		D		L		D	
	m	f	m	f	m	f	m	f
Children	14	9	25	11	7	5	45	33
Av. Children per mother	2.36				2.81			
Av. Living „ „ „	0.92				0.38			
Sex Ratio	39 m : 20 f				52 m : 38 f			
Net Reproductive Index	0.36				0.16			

TABLE XIV

Numbers and Ages of Unproductive Mothers

N. Andaman.		S. Andaman.	
25 yrs.	3	23 yrs.	1
26 „	3	26 „	2
27 „	2	27 „	2
28 „	5	28 „	2
29 „	1	29 „	1
33 „	1	30 „	1
35 „	2	32 „	2
36 „	2	37 „	1
37 „	1	38 „	1
45 „	1	40 „	3
	21	42 „	1
			17

Whether the Andamanese migrated into the Islands as a perfected type or the mutation and the selective process occurred in the local soil must remain an open question till a thorough genetic survey of the Andaman Negritos is carried out. A few points are worthwhile mentioning at this place. It will be seen from Table XII that among both the sexes the frequency of short stature cannot be altogether ignored. Among the males a small percentage of medium statured population is present as well. Eugen Fischer is right in designating the Andaman Negritos as pygmoids rather than pygmies. This may probably be explained by the fact that, by the year 1882, the selective elimination of the other types of stature was not complete. Portman (1899) pointed out that during the measles epidemic of March, 1877 the majority of deaths were from among the robust adult males. It would thus not be unfair to assume that there were, at certain times, more medium or short statured peoples than what was found in 1882 by Man, and that they have undergone some amount of selective elimination on the Andaman soil. It is also possible that the Andamanese underwent some form of endocrine

imbalance due to their migration in an insular area, which was originally foreign to them. The endocrines not only retarded their stature but probably reacted upon their reproductive physiology also.

Migratory Route of the Andamanese

The recent deep sea researches of Molengraaf (1921) have been utilized by Kaudern (1939) to interpret the probable routes of migration of the Negritos into the Andaman Islands. Kaudern has shown that during the quaternary times the alternating glacial and interglacial periods due to the severe climatic changes, brought in a rise and fall in the sea level. The great submarine ridge stretching from southern Burma to near about the northern point of Sumatra, whose highest points represent the present day Andaman and Nicobar Islands, is already well known. A fall of 300 metres in sea level would establish a direct contact with Burma and make the migration of man and animals possible. And this could be possible during a glacial epoch alone.

The Andaman and the Nicobar Islands are separated by a wide strait and the absence of Negritos in the Nicobars is explained by Kaudern as follows : 'If the pygmies, when they migrated from the continent towards the south, were able to reach the former (*Andamans*) but not the latter islands (*Nicobar*) it means that there has at some time been a fall of sea-level of nearly 300 metres, but not so much as 600 metres in these tracts'.

That the Andaman aborigines take advantages of the tides and the intervening small islands or large rocks will be apparent from the behaviour of the Jarawas in course of their regular migrations from the South Andaman to the Middle Andaman along the west coast of the Andaman Islands. The Islands have a general slope towards the east which causes the western coast to rise more above the water during the low tide. On the west coast between the South Andaman and Middle Andaman there are two islands—the Bluff Island and to the north of it the Spike Island. The Jarawas come from the South Andaman to the Bluff Island (Fig 16) and then to the Spike Island and then to the Middle Andaman. The sea is crossed by rafts, which are made of a large number of light hollow bamboos tied with one another in the shape of a large rectangle, and the paddles are made by splitting half the large spade of *dani* cocoanut (*Nipa*

fruticans). After the sea is crossed the raft is rolled into a large bundle and left in a safe place. This is the only route

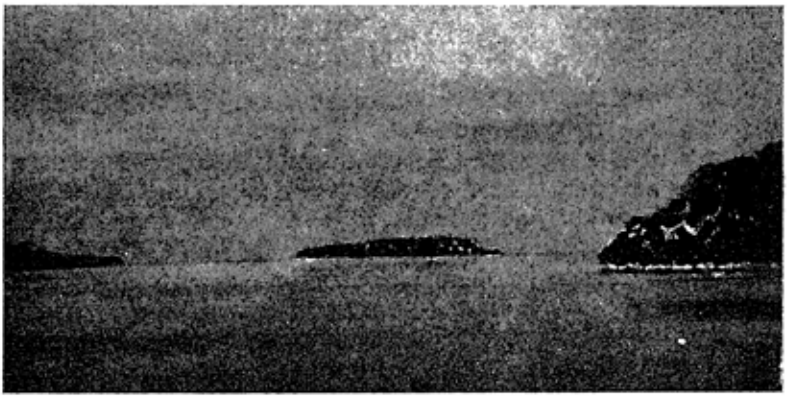

Fig. 16.
Bluff Island between S. Andaman and Spike Island

of migration of the Jarawas from the north to the south and their haunts of temporary abode in the intermediate islands are quite well known.

Such sea-faring men were responsible for the peopling of the Andaman Islands in the hoary past. The out-rigger canoe of the Onges of Little Andaman appears to be a later intrusion and the primitive Jarawa raft was probably the one used for transport.

Summary

It will be apparent from what has been said above that the sporadic cases of frizzly hair may not be Negritoid at all. They may be independent mutations. Whether they are genetically related to the Negro frizzly hair group or the Melanesian frizzly hair group, only further genetic researches can disclose. Both Guha and Eickstedt appear to favour the Melanesian origin, but when we are reminded of Eugen Fischer's hypothesis of the origin of the spirally curved hair from the smooth, wavy hair of the Veddas, the possibility is extended in other directions. In this connection, Sir Arthur Keith's observation in Chapter II is most significant : 'The bridge which links the Pathans of N. W. to the hill-tribes of Travancore is still in existence. If evolution be true, and if the 352 millions of people now in India are members of the same great branch

of humanity, this ought to be the case. Yet, strange to say, all or nearly all who have sought to explain the differentiation of the population into racial types have sought the solution of this problem outside the peninsula. They have never attempted to ascertain how far India has bred her own races. They have proceeded on the assumption that evolution has taken place long ago and far away but not in the great anthropological paradise of India'.

Further researches should therefore be undertaken with these possibilities in view. Guha (1937) has mentioned De Terra's researches in the Soan Valley which have yielded artefacts similar to the Upper Palaeolithic cultures of Europe, and there should be every reason to expect skeletal remains of early man in our own country. De Terra (1949) is equally emphatic and optimistic about such a possibility.

The different ways of pygmy formation or dwarfism have been discussed. A retardation in growth in early life appears to be associated with dwarfism.

The Negritos of the Andaman Islands have been discussed in the light of the process of pygmy formation. Steatopygia, infantilism and dwarfism are probably the effect of endocrine derangements and the reproductive physiology of the Andamanese appears to have been affected as well. The Andamanese appear to have been facing extinction long before they came in contact with civilization, as is seen in their very low net reproductive index in 1893-94.

The Andamans were probably peopled in the quaternary times during a glacial period when the fall of sea-level brought lower Burma in direct contact with the islands. The migration possibly took place in the primitive Jarawa rafts by hops through intervening islands during low tides.

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CHAPTER V

THE MUNDA IN INDIA

The Munda problem in India has received more attention from the linguistic point of view than from the standpoint of physical anthropology. Pater Schmidt's (1906) proposed association of the Munda and Mon-Khmer languages met with a strong criticism from von Hevesy (1932), who on the other hand showed a striking similarity between the Munda and the Finno-Ugric languages. Bowles (1943) in an able review has almost rejected both the above hypotheses and is of opinion :

"At present, the most that can be said with reference to the possible linguistic affinities of the Munda languages is that eventually we should expect to find some demonstrable proof of relationships to other languages somewhere. To date no such proof nor even substantial evidence either philological or grammatical is, I believe, available. * *"

"As to the racial argument, I do not believe there is any basis for believing that language and physical characteristics have any innate sympathy for each other which binds them together permanently. As to the racial data, they, too, are insufficient to form any far-reaching conclusions".

Pater Schmidt in his earnestness to connect the linguistic association with racial data utilized the anthropometric data of various authors, which, as pointed out by Bowles, included Risley's anthropometric data from Chota Nagpur and "only part of these are Munda and the remainder are either Dravidian or Indo-European". The nature of this study by Schmidt is not very much convincing rather much has been assumed. Bowles has pointed out : "It has been further assumed, but certainly not demonstrated either by Schmidt or v. Eickstedt, that there is a common physical relationship among the Munda, the Khasi (Mon speakers in Assam) and other Mon and Khmer speakers of southeast Asia". In concluding Bowles remarks : "A great deal more comparative work, not only in language but also in material and social culture as well as racial studies, must be undertaken before Pater Schmidt or v. Hevesy's or any one else's pronouncements can be accepted".

Munda-Dravidian Affinities

Pater Schmidt's utilization of Risley's anthropometric data probably emboldened Risley (1915) to propose openly the unitary ethnic origin of the Munda and the Dravidian speaking peoples. This ethnic point of view was not probably at all enquired into before Basu, who in two successive studies on the Mundas (1932-33) and the Oraons (1933-34) showed the difference* between the above two peoples, the former a Mundari-speaking and the latter a Dravidian-speaking, in an almost contiguous area of the district of Ranchi.

The district of Santal Parganas, specially the northern portion occupied by the Rajmahal Hills, offers one of the best spots of testing the question of Munda-Dravidian affinity. The plains are occupied by the Santals—a Mundari-speaking people while the hill tops of the Rajmahal Hills are occupied by a Dravidian-speaking people, the Mālé, of whom we have discussed in detail in Chapter III before. Here we will discuss the Santal-Mālé relationship only from the standpoint of Munda-Dravidian affinity. Table XV gives the mean values of the Munda-speaking peoples while the Mālè means will be found in Table I. Table XVI gives the differences between the mean values and their significance ratios. It will be seen therefrom that the differences between the Santal and the Mālé are highly significant while the relationship between the other three Munda groups are much closer than the former. The Munda sample of Basu and the Ho Munda of Bowles stand closest in relationship among the above three groups.

*It is not known how Guha concluded otherwise in respect of Basu's data. Guha's value for C.R.L. is 1.79 as opposed to 22.58 of Basu.

TABLE XV

Means of the Munda-speaking Tribes

Sr. No.	Characters	SANTAL (author)			MUNDA (Basu) (250) Mean ± P.E.	HO MUNDA (Bowles) (67) Mean ± P.E.
		No.	Range	Mean ± P.E		
1.	Stature	168	143.7—175.1	159.60 ± .27	158.15 ± .20	159.18 ± .36
2.	Head Leng.	166	169—213	186.95 ± .32	186.95 ± .24	184.89 ± .50
3.	" Breadth	168	129—148	138.90 ± .23	138.09 ± .18	135.97 ± .35
4.	" Ht.	167	108—141	125.92 ± .36	120.33 ± .27	119.46 ± .48
5.	" Circumference	32	500—560	526.70 ± 1.72	534.36 ± 0.51	530.75 ± 1.25
6.	Min. Fr. Diam.	168	91—112	101.20 ± .19	101.92 ± .16	101.50 ± .32
7.	Bizygo. Br.	168	120—146	133.51 ± .23	131.70 ± .17	130.95 ± .34
8.	Bigonial Br.	167	86—111	99.39 ± .24	99.52 ± .20	100.50 ± .44
9.	Nasal Ht.	168	40—59	48.74 ± .18	48.41 ± .13	49.58 ± .30
10.	" Br.	168	32—45	37.92 ± .12	40.18 ± .11	40.37 ± .27
11.	Tot. Facial Ht.	168	101—135	114.72 ± .28	111.75 ± .23	114.35 ± .56
12	Leng. Br. Ind.	166	66.49—84.62	73.85 ± .18	74.34 ± .12	73.47 ± .25
13.	" Ht. Ind.	167	58.08—73.37	66.96 ± .16	64.40 ± 15	64.32 ± .26
14.	Nasal Ind.	168	61.40—95.35	78.46 ± .38	83.29 ± .30	81.63 ± .63
15.	Tot. Fac. Ind.	166	74.64—98.48	85.84 ± .26	84.90 ± .19	87.02 ± .43

TABLE XVI

Difference between Means and the Significance Ratios (x.p.e)

Sr. No.	Characters	Mālé-Santal		Santal-Munda		Santal-Ho Munda		Munda-Ho Munda	
		Diff.	x.p.e.	Diff.	x.p.e.	Diff.	x p.e.	Diff.	x.p.e.
1.	Stature	2.96	7.79	1.45	4.26	0.42	0.93	1.03	2.51
2.	Head Leng.	2.74	6.52	0	0	2.06	3.49	2.06	3.75
3.	„ Breadth	1.67	5.39	0 81	2.79	2.93	6.98	2.12	5.43
4.	„ Height	7.60	15.51	5.59	12.42	6.46	10.77	0.87	1.58
5.	„ Circumference	5.35	2.50	7.66	4.28	4.05	1.90	3.61	2.67
6.	Min. Fr. Diam.	0.66	2.64	0.72	2.88	0.30	0.81	0.42	1.17
7.	Bizygomatic Br.	2.53	7.91	1.81	6.24	2.56	6.24	0.75	1.97
8.	Bigonial Br.	2.50	6.76	0.13	0.42	1.11	2.22	0.98	2.04
9.	Nasal Ht.	1.54	6.16	0.33	1.50	0.84	1.31	1.17	3.55
10.	„ Breadth	1.69	9.39	2.26	14.13	2.45	8.45	0.19	0.66
11.	Tot. Fac. Ht.	5.05	12.95	2.97	8.03	0.37	0.59	2.60	4.33
12.	Leng. Br. Ind.	0.69	3.14	0.49	2.23	0.38	1.23	0 87	3.13
13.	„ Ht. Ind.	5.21	21.78	2.56	11.64	2.64	8.52	0.08	0.21
14.	Nasal Ind.	5.84	10.24	4.83	10.06	3.17	4.28	1.66	2.37
15.	Tot Fac. Ind.	2.10	6.18	0.94	2.94	1.18	2.36	2.12	4.51

TABLE XVII

Size of Inter Group Differences in Terms of P. E.

	0-1	1-2	2-3	3-4	4-X	Total
Mālé-Santal	0	0	2	1	12	15
Santal-Munda	2	1	4	0	8	15
Santal-Ho Munda	3	3	2	1	6	15
Munda-Ho Munda	2	3	4	3	3	15

Munda in India

We have thus seen that the Mundas do not show any close affinity with the Dravidians and they appear to be recent emigrants in this country. This is in agreement with our findings from blood group studies discussed in Chapter VI. The geographical location of this tribe in comparison with the Australoids also bear it out. The Mundas have always confined themselves along the large river valleys of Eastern Central Inda and been unable to penetrate deep into the hinterland, which were already occupied by the Australoids. The Mundas in Inda have also given rise to peculiar hybrid combinations which are not met with in the case of any other tribe in this country. Risley (1915) recorded nine such groups, who are : (1) Khangar-Munda, (2) Kharia-Munda, (3) Konkpat-Munda, (4) Karanga-Munda, (5) Mahili-Munda, (6) Nagabansi-Munda, (7) Oraon-Munda, (8) Sad-Munda and (9) Savar-Munda. To these may be added Munda-Bhuiya and Munda-Chamar, which the present writer heard of in the district of Palamau in course of his studies there. Risley has noted that they are hybrids and "descended from inter-marriages between Munda men and women of other tribes". Does this show that the Mundas entered India without women ? Tribal inter-marriages are a prelude to miscegenation in India but they rarely take place in the above form by which the two parent groups are so easily recognised. Why is it that in the case of the Mundas alone they have been so earmarked ? Roy (1912), who wrote before Risley, also recorded the custom of inter-marriage between the Mundas of Tamar Pargana with the Bhumijs of the adjoining Pargana of Patkum. According to him, the Khangar-Mundas

are known by different names in different regions, *e.g.*, they are known as Mahli-Mundas in parts of Khunti Thana, and as Marang-Mundas in Belkaddi Pargana. There are other local names as well. The Konkpat-Mundas, according to Roy, occupy the Central Plateau and its neighbourhood and the origin of the term is unknown. All these possibly prove that the Mundas entered into matrimony under various names and among various tribes. A detailed study of these Munda-hybrids is urgently needed to assess the correct position of the Mundas and their affinities.

It has been shown in the Chapter on Blood Groups and also pointed out by Macfarlane and Sarkar (1941) long ago, that the Mundas show a relationship with the peoples of the East Indian Archipelago. On this basis it is not unfair to assume a Pareoean element among the Mundas, which Dudley Buxton (1925) has also tried to prove. Unfortunately no detailed studies on the hair form of any group in this country have so far been made although it appears from the few observations of the present author that the not infrequent presence of straight hair among the Santals and the Mundas, is also indicative of a foreign element in the population. The absence of brachycephaly among the Mundas is not to be surprised of. Haddon (1924) has already pointed out that the Pareoeans have considerably mixed with local non-Mongolian races". This appears to be true as shown by Hætinger (1943), where among nine male and seven female skulls from the Mawken of the Mergui Archipelago he found only one male and three female skulls to be brachycephalic. Both the Veddid and the Proto-Malayan elements are strongly present in the skulls and in the physical features of the living.

The Khasis of Assam

The Khasis of Assam have been subjected to more anthropometric studies than any other tribe. There are five series of anthropometric data on them and two samples of blood group data as well. A detailed discussion on this people is not therefore, out of place. The Khasis are the only representative of the Mon-Khmer linguistic family in continental India and a possible relationship with the Munda language has been stressed by the Schmidt school. The latter has also assumed a common affinity in physical features with the Munda. Bowles' opinion on this point has been discussed towards the beginning

of this chapter. His mean values for the Ho Munda anthropometric characters are given in Table XV while those for the Khasis are shown in Table XIX. As will be evident from Bowles' significance ratios (Table XVIII) between the above groups the differences are highly significant. Bowles writes : "As to the position of the Ho Munda, it is quite apparent that in almost every measurement and most of the indices the differences between them and any of the other groups are highly significant".

TABLE XVIII

Significance Ratios between Khasi & Ho Munda (after Bowles).

Measurements		Indices	
Weight	0	Relative Span	7
Stature	2	„ Sh. Br.	5
Span	7	Sh.-Hip.	5
Biacromial	1	Thoracic	2
Biiliac	6	Rel. Sitt. Ht.	12
Chest Br.	3	Cephalic	9
Chest Dp.	0	Leng.-Ht.	8
Sitt. Ht.	7	Br.-Ht.	1
Hd. Circumf.	11	Fr.-Par.	9
Hd. Leng.	5	Ceph.-Fac.	8
Hd. Br.	16	Zygo.-Fr.	2
Hd. Ht.	11	Fr.-Gon.	0
Min. Fr.	3	Zygo.-Gon.	1
Bizygo. Br.	7	Facial	4
Bigonial	3	Upp. Fac.	4
Tot. Fac.	8	Nasal	12
Upp. Fac.	8		
Nose Ht.	9		
Nose Br.	6		

TABLE XIX

Comparative Khasi Anthropometric Data

Sr. No.	Characters	Waddel (1901) 70	Dixon (1922) 25	Raichaudhuri (1935) 132	Guha (1935) 81†	Bowles (1943) 71
1.	Weight	—	—	—	—	111.70 ± .94
2.	Stature	157.09 ± .40	156.88 ± .65	158.44 ± .34	156.91 ± .47	158.19 ± .34
3.	Span	—	—	—	—	164.25 ± .49
4.	Sitting Ht.	—	—	—	—	84.76 ± .22
5.	Hd. Circumference	—	—	—	538.75 ± 3.30*	548.90 ± 1.09
6.	Hd. Length	184.06 ± .37	183.12 ± .62	189.55 ± .36	186.90 ± .42	188.31 ± .42
7.	Hd. Breadth	143.43 ± .35	143.36 ± .60	147.65 ± .34	144.50 ± .40	145.03 ± .45
8.	Hd. Height	—	—	135.11 ± .34	125.60 ± .46	126.58 ± .41
9.	Min. Fr. Diam.	—	—	—	101.40 ± .39	103.10 ± .33
10.	Bizygomatic Br.	—	133.16 ± .55	135.10 ± .31	133.80 ± .41	134.60 ± .44
11.	Bigonial Br.	—	—	101.67 ± .33	106.10 ± .64	102.66 ± 50
12.	Tot. Fac. Ht.	—	112.24 ± .69	114.47 ± .37	113.10 ± .44	120.05 ± .44
13.	Upp. „ „	—	—	—	67.00 ± .29	70.70 ± .37
14.	Nasal Ht.	44.60 ± .24	49.52 ± .58	49.84 ± .17	49.10 ± .29	53.30 ± .28
15.	„ Br.	38.43 ± .18	38.76 ± .62	38.35 ± .14	37.90 ± .20	38.51 ± .19
16.	Cephalic Ind.	77.93 ± .22	78.34	77.81 ± .02	77.30 ± .20	77.07 ± .30
17.	Leng. Ht. Ind.	—	—	71.28 ± .32	67.10 ± .27	67.55 ± .25
18.	Facial Ind.	—	84.31	84.73 ± .31	84.50 ± .34	88.89 ± .44
19.	Upp. Fac. Ind.	—	—	—	50.00 ± .25	52.59 ± .37
20.	Nasal Ind.	86.08 ± .61	78.78	76.75 ± .38	77.40 ± .52	73.58 ± .43

† n for sl. 8 and sl. 17 is 76 * n=16

TABLE XX

Differences of Means between Khasi Samples with values in terms of P. E.

Sr. No.	Characters	Raichaudhuri & Bowles		Raichaudhuri & Guha		Bowles & Guha	
		Diff.	x.p.e	Diff.	x.p.e	Diff.	x.p.e
1.	Stature	0.25	0.48	1.28	2.10	1.53	2.66
2.	Head Leng.	1.24	2.25	1.41	2.39	2.65	4.82
3.	„ Breadth	2.62	4.68	0.53	0.88	3.15	6.06
4.	„ Height	8.53	16.09	0.98	1.58	9.51	17.29
5.	Tot. Fac. Height	5.58	9.79	6.95	11.21	1.37	2.40
6.	Bizygomatic Breadth	0.50	0.93	0.80	1.33	1.30	2.55
7.	Bigonial Breadth	0.99	1.65	3.44	4.25	4.43	6.15
8.	Nasal Length	3.46	10.48	4.20	10.50	0.74	2.17
9.	„ Breadth	0.16	0.67	0.61	2.17	0.45	1.88
10.	Ceph. Ind.	0.74	2.47	0.23	0.64	0.51	2.55
11.	Leng. Ht. Ind.	3.73	9.10	0.45	1.22	4.18	9.94
12.	Tot. Fac. Ind.	4.16	7.70	4.39	7.84	0.23	0.50
13.	Nasal Ind.	3.17	5.56	3.82	5.70	0.65	1.02
14.	Hd. Circumference	—	—	—	—	10.15	2.93
15.	Min. Fr. Diam.	—	—	—	—	1.70	3.33
16.	Upp. Fac. Ht.	—	—	—	—	3.70	7.87
17.	„ „ Ind.	—	—	—	—	2.59	5.76

TABLE XXI

Size of Intersample Differences in terms of P. E.

	0—1	1—2	2—3	3—4	4—X
Raichaudhuri & Guha	1	2	5	0	5
" & Bowles	3	1	2	0	7
Guha & Bowles	2	3	3	0	5

Khasi Anthropometric data

Of the five anthropometric series, Waddell and Dixon's data are comparatively old and as such a detailed treatment of those of Raichaudhuri, Guha and Bowles has here been undertaken. Further Raichaudhuri has already discussed Dixon and Waddell's data in his paper.

It will be seen from Raichaudhuri's (1935) study that although the Khasis possess short stature and mesocephalic head, according to Waddell, Dixon and Raichaudhuri, there are variations in the face and nose. Although Dixon's sample is too small, the majority of the mesorrhine form of nose is confirmed by both Dixon and Raichaudhuri while Waddell's sample shows a high frequency of platyrrhine nose. This is evident from the mean values as well.

Haddon (1922) in his *Races of Man,* has accepted the mean nasal index of Waddell, while in respect of stature and cephalic index he has followed the mean values of Dixon. Raichaudhuri has already pointed out this discrepancy in his paper. It is difficult to understand why Haddon preferred to group the Khasis under a platyrrhine nose.

In facial index there is also slight difference between Dixon and Raichaudhuri ; while the former found the majority of euryprosopic faces, the latter found a majority of mesoprosopic ones. Dixon found mesoprosopy second in order while Raichaudhuri found leptoprosopy next to mesoprosopy. Raichaudhuri's averages for all the characters are higher than those of Dixon and Waddell excepting that for nasal breadth and the differences in head length and head breadth are probably significant. Compared with Guha's means, Raichaudhuri's mean values are also much higher excepting that of

bigonial breadth, which is significantly the highest of all in the case of Guha. Raichaudhuri's means on the other hand stand closer to Bowles (1943) in certain characters, *e.g.*, stature, head length, bizygomatic breadth and nasal breadth while in head breadth and head height, Guha and Bowles agree with one another. The head height measurement of Raichaudhuri, that of bigonial breadth of Guha and that of total facial height of Bowles stand out singly. Bowles' mean for nasal length is also the highest of all. The differences between the means of the above three authors and their significance ratios have been given in Tables XX and XXI.

Bowles found a great contrast with Guha's sample and did not undertake any comparison with the latter. He has made the following remarks, which however, do not clarify the position : "The Khasi sample is somewhat different from that given by Guha in the "Census of India". A probable explanation is to be found in the samples themselves rather in the technique of measuring. I measured everybody who presented himself as a Khasi and whose identity was established as such by those about him. The sample collected by Guha, on the other hand, was selected with a view of eliminating people suspected of having partial Assamese or Bengali ancestry. Arguments may be presented for both methods of selection, but for present purposes it is sufficient to state that the differences between Guha's sample and my series would indicate that were Guha's sample used, the contrast between it and my Munda sample would be even greater".

Bowles is right in his above statement since foreign elements in a population can not always be detected with ordinary eye estimation, rather the sample is vitiated by selection. But were an actual comparison undertaken by Bowles, the two samples would not have appeared very much different except in total facial height, bigonial breadth and nasal height. In total facial height and nasal height, Dixon, Guha and Raichaudhuri agree closely. It is difficult to interpret the above high differences—it may be due to errors in measurements, the selection of subjects, geographical variation and hybridization. Raichaudhuri's measurement for head height, Guha's for bigonial breadth and Bowles' for facial height and nasal height are very high estimates.

At the same time there is enough room for the changes in physical features due to hybridization. Guha did not take any

measurement from Shillong "as some amount of miscegenation is supposed to have taken place" there. Although Guha's actual date of measurement is not known the Khasis are being progressively accultured under missionary education and culture. Inter-marriages with European planters and other plains people are gradually on the increase. None of the above anthropometric data were collected from the standpoint of human heredity and a Khasi sample on these lines is urgently required.

Khasi Blood Groups

Let us see how far the Khasi blood group data bear our previous remarks. The two data are as follows :

Khasi Blood Group Data

no.	O	A	B	AB	p	q	r	D/σ	Autror
50 %	46.6	15.6	33.3	4.5					Basu
200 %	33.0	35.0	18.5	13.5	.261	.168	.567	1.7	Macfarlane

The above two series are so contradictory to one another that it is difficult to form an opinion. Macfarlane collected her data from Cherrapunji and she states that inter-mixture has been lesser in this region than in other areas. The high frequency of AB and the high value of D/σ (1.7) however point out to the highly mixed nature of her sample. Basu collected his data from Shillong and for the present we may interpret the difference as regional variations. In future all Khasi studies should have an eye towards inter-mixture and since it is a live process, which can be charted in pedigrees and photographed at times also.

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CHAPTER VI

Blood Groups in India

The evolutionary point of view, as emphasized by Sir Arthur Keith (Chapter II) specially in the case of India, has not received any attention of the physical anthropologists of this country. Happily however, the blood group picture of India has forced the evolutionary point of view. This is all the more necessary if India has the right to claim to be one of the mutational centres of blood groups. Both the blood groups A and B have been reported in very high percentages of 64.2 and 61.24 respectively from India and from the nature of the people involved in the above two frequencies, one of whom, (64.2%) at least, is extremely difficult to be brought from outside this peninsula, it appears that a mutation in the gene A is a corollary necessary to the autochthoneity of the people concerned.

Elsdon Dew (1938) has shown that B mutation is a change in gene A alone since there are no races showing gene B without some gene A and its presence is a *sine qua non* to the appearance of B mutation. The above high percentage of B, as will be shown afterwards, is not similar genetically to the same high frequency of A. The possibility of the B mutation therefore, can not be examined unless this gene is reported in a high frequency under conditions similar to that of A. We have yet large gaps in our knowledge of aboriginal blood groups in this country.

In the following pages an attempt has been made firstly to collate the blood group data according to the racial groups, already formulated and then discuss their inter-relationships.

Australoids

The Paniyans—Highest A

We have already discussed in Chapter III how the Paniyans and the allied aborigines of south India stand in close relationship to the Australoids.

TABLE XXII

Blood Groups of the Paniyans and other Australoids

No.	O	A	B	AB	p	q	r	D/ σ	Author	Year
313	70	201	24	18						
%	22.4	64.2	7.7	5.7	.452	.070	.473	0.5	Sarkar	1950
250	50	156	19	25						
%	20.0	62.4	7.6	10.0	.475	.092	.447	1.1	Aiyappan	1936
563	120	357	43	43					Aiyappan &	
%	21.31	63.41	7.64	7.64	.462	.080	.462	0.5	Sarkar	

Other Australoids

	No.	O	A	B	AB	p	q	r	D/σ	Author
Chenchu	100	37	37	18	8	.252	.133	.608	0.4	Macfarlane
Kannikar	151	60	53	34	4	.235				
	%	39.74	35.10	22.52	2.65		.159	.630	1.7	Bose
Urali	107	49	26	27	5					
	%	45.79	24.30	25.23	4.67	.161	.166	.677	0.2	„

Aiyappan (1936) has already reported the existence of the highest A of India among the Paniyans of the Wynad Plateau, Malabar. This fact is also corroborated by the present writer's studies in 1950. Homozygosis appears to be increasing at the cost of the heterozygotes ; AB alone shows a noticeable decrease of 4.3%. The above two samples show no difference in χ^2 and as such they have been lumped together. The combined data are shown added up in the third line of table XXII.

This is undoubtedly the highest frequency of the p gene so far recorded in this country and one would venture to call it a centre of dispersal of the p gene in this country. Inbreeding is known to be one of the causes of the high frequency of a particular gene and as such this fact was particularly investigated. The exclusively Paniyan village of Chulliot towards the south of the Wynad district was intensively investigated. There were 51 huts and the total population in December, 1950 was found to be 204. Only 73 individuals out of this number were grouped and their blood group distribution is as follows :

	O	A	B	AB	Total
	26	38	5	4	73
%	35.62	52.05	6.85	5.48	

Thirteen other Paniyans from the four villages surrounding Chulliot, namely, Chiral, Kapungere, Kottail and Kakundi were grouped and showed : O-3 ; A-9 ; B-1 ; AB-0 (Total—13). It was found that out of 51 families of Chulliot only 4 were responsible for the 5 group B persons whereas 3 families were responsible for the 4 AB individuals. One family (Fig. 17) alone was responsible for 2 persons of each of the groups B and AB.

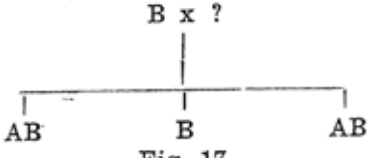

Fig. 17.

The mother could not be tested but she should be either A or AB.

The Paniyans of Chulliot are however similar to the total group in having the highest frequency of A. The 7.64% of B appear to have come into the population through intermixture. The Malayalis, the predominant population of the locality are high in B and the position of this gene will be further under-

stood from the blood group distribution of the neighbouring other tribes, given below :

TABLE XXIII

Blood Groups of other aborigines of Wynad

People	O	A	B	AB	Total
Adiyans	4	26	3	5	38
%	10.5	68.4	7.9	13.2	
Mullu Kuruma ..	51	8	20	1	80
%	63.8	10.0	25.0	1.3	
Vettu Kuruma ..	2	2	12	1	17
Jene Kuruma ..	8	8	1	0	17

The Adiyans, who are socially and culturally somewhat advanced than the Paniyans, present a blood group picture similar to the latter whereas the Mullu Kurumas are characterized by a very low frequency of A—a picture entirely contrary to that of the Paniyans. The Mullu Kurumas are culturally more advanced than both the Paniyans and the Adiyans. They speak a Telegu dialect whereas the Paniyans and the Adiyans speak Malayalam. The Paniyans number 32,410 (♂ —16,560, ♀ —15,850) in the census of 1931, compared with 12,028 (♂ — 6310, ♀ — 5718) of the Mullu Kurumas. The Adiyan population figures are unknown.

Macfarlane and Sarkar (1941) proposed, on blood group evidences, the Paniyans to be one of the aboriginal tribes responsible for the racial make up of the aboriginal tribes of India and this view has been furthurmore strengthened in the earlier chapters of this book. The Vedda blood groups are so far very little known (Osman Hill, 1939) and since a present survey will not probably yield a true picture of the original Vedda, it will not be out of place to assume in the present state of affairs that the Paniyans form the original centre of dispersal of the A gene in the peninsular region of this country.

Let us now go into the details of the other Australoid peoples on whom blood group studies have been done. Besides the Paniyans and other allied tribes of Malabar described before, only four tribes have been grouped. They are Chenchu, Kannikar, Urali and Mālé. Blood group studies of the

Muthuvan and the Pulayan have also been made, but they require further confirmation.

The Australoid affinities of the Chenchus have already been discussed and the 37% of A is the second highest frequency of this gene not only among the Australoids but also in India excluding the N.E. Frontier. Besides the effect of inbreeding in a small population of 2,264 souls (Chenchu population of Hyderabad in 1931), Thurston, as early as 1908, and Macfarlane, the authoress responsible for the blood group data, noticed miscegenation taking place among the Chenchus. The detailed genetic position of the tribe is however, unknown. Regional survey of blood groups are urgently necessary in this country to trace the lines of miscegenation.

The Kannikars and the Uralis (Table XXII) of Travancore are the southernmost congeners of the Australoids. The Kannikar anthropometry has already been discussed in Chapter III. The Kannikars show 35.10% of A while the Uralis possess 24.30% of the same gene. The Kannikars possess much less of the B gene than A while among the Uralis the percentage of B is slightly greater than that of A. Bose (1952) has attributed this varying content of B as probably due to Tamilian intermixture. The internal genetics of the above two tribes and the Chenchus have not been worked out in detail. The Kannikars are scattered throughout a wide area and as such territorial variations are also expected. On the other hand the numerically smaller Urali tribe deserves a more detailed study in the light of population genetics. Unless territorial variations are looked into with all considerations of geographical environments, a true picture of the lines of miscegenation will never come out. Some of the larger tribes like the Santals, the Oraons, the Gonds, etc., might require even a clan-wise study.

The present author (1936-37) elaborated such a method of study in his blood group studies from the district of Santal Parganas and particularly among the Santals and the Mālèr. Prof. Boyd (1940) was good enough to draw attention to the above work in his study on the "Critique of methods of Classifying Mankind".

It was found in course of blood group survey among the Mālér of the Rajmahal Hills that those living on the banks of the River Gumani have a very high frequency of A (39.58%) while another sample collected from other regions showed a high frequency of B (31.65%). This regional difference was not

met with among the Santals. It will be evident from the following table :

Table XXIV

Blood Groups of Santal & Mālé Compared

People	no.	O	A	B	AB
Mālé	139	65	22	44	8
	%	46.76	15.83	31.65	5.76
Mālé*	235	99	60	63	13
	%	42.13	25.53	26.81	5.53
Mālé	96	34	38	19	5
	%	35.62	39.58	19.79	5.21
Santal	199	64	41	70	24
	%	32.16	20.60	35.18	12.06
Santal*	339	112	71	118	38
	%	33.04	20.94	34.81	11.21
Santal	140	48	30	48	14
	%	34.29	21.43	34.29	10.0

The only justification of combining the two Mālér samples lies in their undifferentiated value of $\chi^2 = 4.90$ ($P = 0.18$) but from the standpoint of genetics and anthropology the two samples may mean much more. From the physical features the Mālé has been shown to be a close congener of the Australoid stem and as such it will not be out of place to assume that the high A of 39.58% is true of the Mālé type while the high B of 31.65% is due to intermixture with the plains people, who are all high in B. The Mālé has been subjected to great pressure during the early days of the British rule and they were forced to come down the hill and settle on the plains. They were forced to form a corps known as the "Bhagalpur Hill Rangers" and they were always stationed at Bhagalpur. The sepoys who retired from this army were forced to settle on the plains.

* Total of the Series.

This brief review of the blood groups of the Australoids thus shows that a high frequency of the gene A is the characteristic of the Australoids and the varying frequency of the gene B is due to the amount of intermixture undergone by the tribe itself.

It is difficult to say in the present state of our meagre knowledge whether this A is different from the A found among the Mongoloid tribes of the N.E. Frontier. We have shown the extent of the Australoid strain in Chapter III and its presence, which is probably similar to the non-mongoloid element of certain authors, may be assumed as accompanied with the blood group A. The high A among the Chinese of Hunan and the Shanshi aborigines are already well known, as also the strong Veddid or Australoid element among the aborigines of the Indo-China Hills. At the same time the Senoi blood groups require some detailed discussion—particularly because of Polunin's (1952) assertion "as to render improbable the relationship implied by the terms Proto-Australoid and Vedda-Australoid". The authoress has not probably taken into account at all the factors of intermixture and that this factor is always working among human populations. We do not know what a typical Vedda-Australoid blood group is like. Nothing is known of the Veddas and what we know of the present Australian blood group may be the result of the crossing of two or three races as Birdsell and Boyd (1950) have found.

Further the blood group distribution of the Senoi has probably been too simply painted by Polunin. She lumped her own data with those of Green, whose detailed data are as follows :—

TABLE XXV

Blood Groups of the Senoi

Group	no.	O	A	B	AB	p	q	r	Author
Semai .. (Tanah Rata)	117	62	12	36	7	.080	.199	.721	Green
	%	53.0	10.3	30.8	5.9				
Sakai .. (Selangor)	66	31	12	19	4				Green
	%	46.9	18.2	28.8	6.1				
	183	93	24	55	11				Green
	%	50.82	13.11	30.05	6.01				
Temer .. (Grik)	18	11	6	1	0				Schebesta
	%	61.1	33.3	5.6	0				
All Senoi ..	201	104	30	56	11	.102	.179	.719	Green & Schebesta
	%	51.7	14.9	27.9	5.5				
Senoi	450	50%	7%	39%	4%				Polunin

It will be seen from the above detailed data that Polunin's percentage of A(7%) is the lowest while that of B(39%) is the highest of all. Schebesta's small sample, if confirmed by a larger sample later on, will give an entirely different picture and the above sample has been combined with those of Green by Schebesta himself, though the present author is doubtful of the validity of a such a combination. All the above series however, show one common feature, namely, the highest frequency of O and it will not be unfair to assume that the Senois are predominantly a group O people and the two genes p and q have been acquired through inter-mixture. No other Australoid group, except, the Australian aborigines themselves, show such a consistently high frequency of O and this combined with other characteristics does not remove them far off the Australoid stem, as apprehended by Polunin.

Negritos

The Negrito blood groups until recently were not fully known. There were practically no data from the Andaman Islands although Eickstedt's Onge blood group results were rather peculiarly published by Steffan (1932). Eickstedt's results are peculiar in the sense that he found all the Onges belonging to blood group B and Schebesta has considered them as carriers of the B blood group. Nothing is known of the number of the individuals tested. A group of people belonging to blood group B alone has not yet been reported from any part of the world and Elsdon Dew's remarks at the beginning of this chapter may again be referred to here.

The present writer did not take into account Eickstedt's blood group data in his paper on the "Blood groups from Andaman and Nicobar Islands" (1952) but since Schebesta (1952) has recently discussed Eickstedt's results he is obliged to comment on them. The present writer grouped 34 Onges of the Little Andaman island in 1948 and found the following blood group distribution :

	O	A	B	AB	Total
	5	23	2	4	34
%	14.71	67.65	5.88	11.76	

The predominance of the group A was already noticeable from Chaudhuri's (Gates, 1940) earlier study of 5 Onges, 3 of whom belonged to A and 1 each to groups O and B.

Four Jarawa children were also grouped during 1948, all of whom were found to belong to group O.

The blood group A was also found to be predominating among the friendly Andamanese of the Great Andaman island. This population is nearly extinct and during the census of 1951 they numbered only about 40 souls. 22 individuals were grouped out of them and they showed the following blood group distribution :

	O	A	B	AB	Total
	2	13	5	2	22
%	9.09	59.09	22.71	9.09	

The above population is highly mixed and the high frequency of B (22.71%) appears to be extraneous in origin.

Thus to form a blood group picture of the Negritos of the Andaman Islands, the Onge and the Jarawa data can be combined together, which show the following distribution :

	O	A	B	AB	Total
	11	23	2	4	40 (34 Onges + 6 Jarawas)
%	27.50	57.5	5.0	10.0	

It will be apparent from the above results that B is a rare group among the Negritos of the Andaman Islands and Eickstedt's findings of 100% B appears to be due to technical defects in the actual determination of the groups. But we can only assess his data if we know the number of individuals tested by him.

The other Negrito groups further east of the Andamans, namely the Semangs, the Aetas, also show the predominance of the p gene and the q gene has a minor role. Thanks to Schebesta that he has devoted a separate chapter of his book to the blood groups of the Negritos. His data (Table XXVI) are given in detail along with others who have also worked in this field.

The Semang groups agree with the Senoi groups in their general nature although the Jahay-Lanoh of Perak and the Kenta'-Nakil of Kedah show a strikingly high percentage of O. The other Semang group is a combined data of the two groups Kenta'-Bog'n and Kensiu although both are from the same region. The low contents of the two genes among the first two groups appear to be due to scant infiltration through miscegenation—the Semang blood group being predominantly O like the Senoi.

Table XXVI

Blood Groups of the Semangs and the Aetas compared with the Andaman Negritos

Groups	Locality	No.	O	A	B	AB	p	q	r	Author
SEMANG.										
Jahay-Lanoh	Perak	119	32	19	17	1	.080			
		%	68.9	16.0	14.3	0.8		.112	.830	Schebesta
Kenta'-Nakil	Kedah	50	31	8	9	2	.100			
		%	62.0	16.0	18.0	4.0		.269	.788	"
Kenta'-Bog'n & Kensiu	Kedah	55	18	13	19	5				
		%	32.7	23.6	34.6	9.1	.179	.249	.572	"
AETA										
Hambal	Bataan	67	30	37	0	0				
		%	44.8	55.2	—	—	.331	—	.669	Schebesta
"	Zambales	155	79	51	19	6				
		%	50.9	32.9	12.3	3.9	.204	.084	.713	"
"	"	297								
		%	48.5	33.4	14.1	4.0				Grove
"	"	452								Grove &
		%	49.3	33.2	13.5	4.0	.198	.100	.720	Schebesta
Manide	Camarines	75	68	3	3	1				
		%	90.7	4.0	4.0	1.3	.024	.024	952	Schebesta
Baluga	S. Madre	28	9	13	5	1				
		%	32.1	46.4	17.9	3.6	—	—	—	"
Ati	Negros	28	13	7	7	1				
		%	46.4	25.0	25.0	3.6	—	—	—	"
ANDAMAN NEGRITOS										
Onges & Jarawas	Andaman Islands	34 6								
		%	11 27.50	23 57.50	2 5.0	4 10.0				
Andamanese	Great Andaman Islands	22	2	13	5	2				Sarkar
		%	9.09	59.09	22.71	9.09				

The Aetas on the other hand show two types of pictures. On the one hand, the Manide from Camarines show the exceptionally high percentage of the group O (90.7) while on the other hand, another somewhat uniform picture is yielded by the other 5 groups who have varying contents of the two genes p and r. These variations have been probably due to the influx of the q gene which varies between nil to 25%. The Hambal from Bataan has no B at all while the Ati from Negros shows 25% of the same blood group. The Aetas therefore, appear to have like the Negritos of the Andamans, a high content of the p gene and whatever q has entered into the population appears to be extraneous in origin. The Semangs do not possess a high amount of either of the two genes p and q and are thus differentiated from the other two Negrito groups in this respect.

The Negritos and the Australoids thus agree with one another in having high contents of the p gene. We have discussed in earlier chapters the possibility of the Negritos originating from the Australoids and it appears therefrom, that while there have been changes in the morphology of the hair, head, and physique, the blood groups probably remained unaltered. The A mutation probably occurred in the Australoid stem prior to the Negrito differentiation although there are chances of independent A mutations occurring in the Negrito stem as well. The absence of a high frequency of A among the Semangs, the Senois and the Aetas of Camarines as well points out against too many mutations having occurred, since they still predominate in O. On the other hand, an early A mutation in the Australoid stem prior to the Negrito differentiation is probably justified on account of the presence of high A (47.4%) among the Mangyanen of Mindoro whom Schebesta has classified under the primitive Malayan group and found strong Veddoid characteristics. Unfortunately Schebesta has been able to group only 6 Bukidnons from Negros (0-66.6%, A-16.7%, B-16.7%) otherwise a fairly large sample of this mixed old 'Malayan-Negrito-Veddoid' stock would have been interesting. All these however, prove the extent of the Veddid or the Australoid strain in the Phillipines and the high A has probably been due to them.

Mundaris

The Mundaris have been subjected to more blood group studies than the Australoids in this country. So far seven different samples have been, rather studied in detail, whose blood groups are given in the table below.

Table XXVII

Blood Groups of the Mundaris and the Maria Gonds (Dravidian-speaking)

Sr. No.	Peoples	no.	O	A	B	AB	p	q	r	D/σ	Author
1.	Birjia	129	14	22	79	14	.198	.519	.329	1.9	Sarkar
		%	10.85	17.05	61.24	10.86					
2.	Birhor	39	8	7	20	4	—	—	—	—	"
		%	20.51	17.94	51.30	10.25					
3.	"	102	32	36	24	10					Majumdar
		%	31.37	35.29	23.53	9.80					
4.	Korku	140					.250	.313	.447	0.4	Macfarlane
		%	20.0	28.57	37.86	21.05					
5.	Santal	407	129	87	145	46	.166	.258	.563	1.5	Sarkar & Sen
		%	31.70	21.38	35.63	11.30					
6.	Maria Gond	123					.204	.257	.534	0.3	Macfarlane
		%	28.5	26.0	34.1	11.4					
7.	Munda	130	46	38	37	9	.219	.214	.577	0.6	"
		%	35.38	29.23	28.46	6.92					
8.	Ho	186	65	59	52	10					Majumdar
		%.	34.95	31.72	27.96	5.38					

In Table XXVII the tribes have been arranged in the descending order of frequency of the gene q in which the highest frequency (61.24%) has been found among the Birjias of Palamau and the lowest (27.96%) among the Hos. All the above tribes, excepting the Maria Gonds, are Mundari-speaking and although there are slight dialectical variations among each, some of the groups, *e.g.*, the Santals, the Birjias and the Birhors speak a mutually intelligible language. All the tribes inhabit a more or less contiguous area on the eastern portion of the Central Indian highlands and their ethnic and cultural affinities point to a common origin.

The Birjias (highest B)

The highest B of 61.24% has been found among the Birjias of Palamau. The small group of 45 Birjias, reported earlier (Sarkar, 1949) yielded 48.89% of B. The Birjia data were further increased in 1951 by the present writer and the two frequencies are compared below :

Table XXVIII
Blood Groups of the Birjias

no.	O	A	B	AB	
45	5	13	22	5	1949
%	11.11	28.89	48.89	11.11	
84	9	9	57	9	1951
%	10.71	10.71	67.86	10.71	
129	14	22	79	14	Total
%	10.85	17.05	61.24	10.86	

The total Birjia population in 1941 was 2075 of which 1594 were in Palamau and the rest 481 in Ranchi district. Inbreeding within such a small population is likely to be very high and the expected value of 2pq is 20.66% as compared with the observed value of 10.86%. The χ^2 between the above two percentages is 2.45 which means that the difference is not significant. While it is rather difficult to explain the Birjia data, a few tentative suggestions can be made :

In view of the isolated nature of the Birjias and their small population, which is much lesser in comparison with the Paniyans, inbreeding has been very high which has caused the q gene increase at the expense of the recessive O. The Birjias appear to have close affinity with the Santals in respect of physical features and language and the frequency of A nearly agrees with one another. Taking the Santal frequency as the standard, if the loss of O in the Birjia is added to the lesser B frequency of the Santal we nearly arrive at the high B of the Birjia. It can be shown as such,

Loss of O in Birjia from Santal O = 31.70—10.85 = 20.85

Loss of O+Santal B = 20.85+35.63 = 56.48

Thus 56.48% of B agrees fairly with 61.24% of B of the Birjias. The phenomenon of the loss of genes in blood groups was possibly first proposed by Boyd (1940) and while a theoretical concept can be made out of it, its actual proof from the field data is yet a problem. At the same time the loss of a gene should be accompanied by the gain of another gene unless a total extinction occurs.

Populations exposed to the influences of inter-mixture, isolation or inbreeding are likely to show varying gene frequencies within the same group and at different intervals of time. The latter can be very well seen in the Paniyan data examined after an interval of 15 years. The differences in the blood group frequencies of the Oraons of Ranchi and Palamau (Sarkar, 1949) will be discussed hereafter. The Birjias are subjected to the influences of isolation. Encircled by the reserve forests of the state they have little scope of expansion and their small population is another handicap. The frequency of O (10.85%) is the lowest figure in India and one is tempted to interpret it as a loss of gene.

The same is probably true of the Birhors of the same area. Compared to the settled nature of the Birjias the former are nomadic and their population of 2,350 (in 1931) is almost similar to the Birjias. Majumdar's Birhor data are difficult to interpret and as their details are not known they have been left out for the present. At the same time the present author's sample is too small for any kind generalization. The previous field experiences of the author with regard to the Birjias in 1949 embolden him to mention a few points.

The Birhors belong to the same ethnic and linguistic stock as the Birjias and the Santals and there is no doubt that these smaller tribes like the Birjias, the Birhors, the Asurs, etc., originated from the great Mundari stock, reference to which has already been made in Chapter V. As such the higher content of B than that of A is a likely picture of the Birhor blood groups. Majumdar's Birhor sample requires a special explanation.

The Santal data have already been referred to on page 109. The three Santal groups, collected according to geographical areas, do not show any significant difference like the Mālé. The same, however, is not found when the data are divided on the basis of clans. The Santals have twelve clans, of which the clans Pauria and Bedea are not met with now-a-days. The tenth clan, Chnore, is also dwindling in numbers and only two of its members could be grouped. The rarity of this clan is known to all Santals. The clan-wise incidence of the blood groups is as follows :

Table XXIX

Santal Blood Groups according to clans (absolute Nos.).

Sr. No.	Clans ..	no.	0	A	B	AB
1.	Kisku ..	34	10	6	12	6
2.	Hansdak ..	43	14	9	18	2
3.	Murmu ..	72	23	18	24	7
4.	Hembrom ..	46	21	12	9	4
5.	Marndi ..	35	10	6	11	8
6.	Soren ..	53	16	7	21	9
7	Tudu ..	31	9	8	13	1
8.	Baske ..	6	3	2	1	0
9.	Besra ..	12	3	2	7	0
10.	Chnore ..	2	0	0	1	1
	Total ..	334	109	70	117	38
		%	32.63	20.96	35.03	11.38

It will be seen that when the Santal blood group data are broken up according to clans the frequency of B rises to 40% and above in the case of the clans Hansdak, Soren and Tudu while A rises to 25% and above in the clans Hembrom, Murmu and Tudu. These values are however, not statistically significant from those of the total group. The Hembrom clan, however, shows a significantly lower percentage of the B blood group (19.57%) and is thereby differentiated from the other clans. A correlation of this difference on the basis of anthropometric and other genetic characters may be helpful to find out the different racial elements among the Santals. Some of the clans, Kisku, Soren, Hembrom and Hansdak are characterized by taller statures than the other clans while the Tudu and Marndi clans are the shortest of all. More detailed work are however necessary to substantiate the above brief observations.

The gene frequencies of the other five groups of Table XXVII are so close to one another that it is difficult to differentiate one from the other. All of them show high doses of both the genes p and q, while r stands nearly equal to either of them. Roughly speaking the three genes are distributed in the proportions of nearly one-third each. The position of the Dravidian -speaking Maria Gonds is difficult to assess. They have been incorporated here because of territorial contiguity.

Macfarlane and Sarkar (1941) pointed out that the high frequencies of the two genes p and q are characteristic of the Mundari peoples and they probably entered India well supplied with the two genes. In support of their statement they showed the combination of these two genes among the Mon-Khmer speaking peoples of the East Indian Archipelago. It has been pointed out in Chapter V that the Mundari peoples of India contain in them a certain amount of proto-Malayan blood and Schebesta (1952) has classified the Malayan into three groups, (a) primitive Malayan, (b) old Malayan, and (c) young Malayan. We have discussed the primitive Malayan type before. The other two Malayan groups, old and young, show high amounts of the two genes p and q and that of r is higher than the former two. They are not similar to the approximately equal one-third proportion of the three genes among the Mundaris. It will be apparent from the following comparative table :

Table XXX

Blood Groups of the Mundaris and others from the East Indian Archipelago compared

Peoples	Locality	no.	O	A	B	AB	p	q	r	Author
MUNDARIS										
Santal	India	407	31.70	21.38	35.63	11.30	.116	.258	.563	Sarkar & Sen
Munda	"	130	35.38	29.23	28.46	6.92	.219	.214	.577	Macfarlane
Korku	"	140	20.0	28.57	37.86	21.05	.250	.313	.447	Macfarlane
E. I. Archipelago										
Bug'nese	Celebes	217	34.6	30.4	27.6	7.4	.218	.200	.589	Lehman
Macassar	"	195	28.7	29.7	30.8	10.8	.228	.234	.536	"
Ambom		1471	55.9	20.9	20.9	2.3	.128	.128	.749	Bijlmer
Javanese		1346	39.9	25.7	29.0	5.4	.178	.198	.632	Bais & Verhoef
Phillipines: Igorot	Kakanay	86	63.9	4.7	30.2	1.2	.029	.171	.800	Schebesta
Phillipines: "	Bengnet	166	50.6	22.8	24.1	2.5	.141	.148	.711	"
Phillipines: Kal'nga	Lubuagon	69	56.5	11.6	24.6	7.3	.092	.156	.752	"
Phillipines: Ilocono-Tagalog	Zambales-Bataan	254	43.3	28.0	24.8	3.9	.180	.142	.658	"

It will be seen from the above table that while all the groups agree in the general nature of having high contents of all the three genes, the one-third ratio only fits in well with the two groups from Celebes and to a certain extent in the Javanese. The Mundari peoples are therefore characterized by high contents of the three genes p, q and r and the nearly equal one-third ratio of the three genes in some of them may be taken up as one of their blood group criterion as well.

The Nicobarese of the Nicobar Islands deserve a mention here in view of the similarity in the physical features with the peoples discussed above and their language being of the same Mon-khmer dialect. The present author, during the year 1948, was also able to group 136 Nicobarese from the islands of Car Nicobar and Chaura and their blood group distribution is as follows :

	O	A	B	AB	p	q	r	D/σ
	117	5	14	0				
%	85.03	3.68	10.29	—	.019	.054	.928	0.5

The geographical isolation of the Nicobar islands has been more due to the nature of the deep sea surrounding the islands and Kaudern's remarks on the fall of the sea level (p. 85) may again be referred to here. The Nicobarese, inspite of their cultural affinities with Malaya, have yet remained ignorant of agriculture and it appears that they originally migrated from a region where agriculture was unknown. Probably they are similar to the old Malayan group of Schebesta and the high frequency of 0 is indicative of it.

Mixed Groups

Besides the above blood group data, there are in this country certain other groups, which, by virtue of their peculiarities in their ethnic history, deserve special treatment. We have called these mixed groups, in the sense, that inter-mixture has been, until recent times or even now, a live process among them. They stand in sharp contrast to the isolated nature of the Australoids and seem to possess a certain amount of Munda vigour in them. They are : two sets of Oraon data, one from the district of Ranchi and the other from the district of Palamau ; two sets of Korwa data, one collected by the present author and the other by Majumdar and 4 sets of Bhil data. They are shown in Table XXXI :

Table XXXI

Blood Groups of Mixed Groups.

Peoples	Locality	no.	O	A	B	AB	p	q	r	D/σ	Author
Oraons	Ranchi	155 %	73 47.10	20 12.90	54 34.84	8 5.16	.088	.219	.686	0.8	Sarkar
"	Palamau	115 %	30 26.09	32 27.83	39 33.91	14 12.17	.233	.274	.501	0.4	"
Korwa	Palamau	114 %	22 19.30	31 27.19	37 32.46	24 21.05	.233	.280	.439	2.1	"
"	"	147 %	47 31.7	52 35.6	30 20.4	18 12.3	.257	.159	.563	1.4	Majumdar
Bhil	Nimar	140 %	26 18.57	33 23.57	58 41.43	23 16.43	.218	.344	.431	0.3	Macfarlane
"	Madhya Bharat	534 %	185 34.64	150 28.09	150 28.09	49 9.18	.203	.203	.589	0.6	Bose
"	Panchmahal	369 %	138 37.40	102 27.64	96 26.02	33 8.94	.195	.185	.611	1.0	Majumdar
"	Rajpipla	136 %	60 38.46	38 24.36	45 28.85	13 8.33	.217	.200	.620	0.6	"
"	Khandesh	150 %	60 40.00	43 28.67	36 24.00	11 7.33	.196	.168	.633	0.3	"

As regards the Oraons it is difficult to describe their true blood group picture from the above wide variation in the two series. While the q gene is constant there is a wide variation in the other two genes. The Oraons in Palamau have largely intermixed with the Kharwars who have 20.75% of A and 41.5% of B in them. The Kharwars (Sarkar, 1949) are the predominating population of the district and appear to be largely Mundari both in language and culture. It has already been shown that the same Kharwar intermixture has caused the increase of A among the Oraons and that of B among the Korwas.

The two sets of Korwa data are differentiated samples (χ^2 =12.0, P=.007). The Korwa population in Palamau is very small and they live in a scattered and isolated manner. This has all the more led to intermixture with the neighbouring peoples and in Palamau Korwa-Kharwar inter-mixture is, so to say, a live process. It is usually the Korwa females who are seduced. The high value of D/σ is also indicative of such a miscegenation. It is difficult to interpret the difference in the blood group results of the two series since the geographical area involved is not very wide and a confirmation from a third source is required to assess the data properly.

The Bhil blood group data have been discussed in detail by Bose (1952) and her study was carried out under the present author's close guidance. The Bhils have undergone considerable inter-mixture with the neighbouring peoples and they cover one of the largest geographical area. Grierson (1921) classified the original Bhilli language under the Mundari family though the Bhils now speak an Indo-Aryan language. Nothing is known of the extent of the original Mundari speech in the present Bhil language and further researches on this point are urgently necessary. This is all the more neccessary due to the close correspondence of the Bhil blood groups with those of the Mundaris.

Mongoloids (N. E. Frontier)

The high frequency of the p gene in the N.E. Frontier, Assam, has already been mentioned. The data available so far are as follows :

Table XXXII

Blood Groups from N. E. Frontier, Assam

Peoples	Locality	no.	O	A	B	AB	Author
Angami Naga	Naga Hills	165	46.06	38.78	11.52	3.64	Mitra
Lushai	Lushai „	141	32.63	44.68	16.31	6.38	„
Konyak	Naga Hills	127	45.7	40.2	10.2	3.9	Brit. Assen.
Khasi	Khasi „	200	33.0	35.0	18.5	13.5	Macfarlane
Garo	Garo „	142	26.76	22.53	40.85	9.85	Majumdar

All the groups show a high frequency of the gene p excepting the Garos, who show the highest frequency of B of this region. In respect of A all are more Australoid in nature than any Mundari. They are however differentiated from the Igorots and the Kalingas of the Phillipines (Table XXX) who possess more of the gene q.

It has already been shown that the same tribe shows different blood group pictures and this may be due to the variations in the mating systems within the same tribe. This point of fact should constantly be borne in mind in blood group studies in this country. The majority of the data does not give any information regarding the geographical area covered and as such many data can not be properly assessed. Blood group data should be collected with an eye towards inbreeding, outbreeding, isolation, etc. Many an isolated people has been grouped but nothing is known of the neighbouring peoples. There has been no uniformity in the collection of blood group data in this country as a result many data have remained almost obsolete, incapable of complete explanation. On the other hand the wealth of information blood groups can give will be evident from the titles of a few of the many papers by Prof. Sir R. A. Fisher and his colleagues.

1. Fisher, R.A. and G. L. Taylor—Scandinavian Influence in Scottish Ethnology, *Nature*, 145, 590, 1940.
2. Fraser Roberts, J.A.—Surnames and Blood Groups, with a note on a probable remarkable difference between North and South Wales, *Nature*, 149, 138, 1944.
3. Fisher, R.A. and Fraser Roberts, J.A.—A sex difference in blood group frequencies, *Nature*, 151, 640, 1943.

The N.E. Frontier tribes, as is known from their cultural behaviour, are subject to a large number of cultural taboos and these taboos are also sometimes extended up to restrictions in mating. None of the data given above, shows any details of the internal genetic condition of the tribe but that such factors could be brought out are obvious from the present writer's blood group studies among the Abors of the above region. The latter data are in possession of the Department of Anthropology, Indian Museum, Calcutta since 1949 and it is expected that they will be elucidated genetically. In fact, that would be the only of its kind from the N.E. Frontier.

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CHAPTER VII

Finger Prints in India

Finger prints, studied as a racial character or as a character of hereditary variation, are only a few in this country. The efforts of Dr. P. C. Biswas and his students in this direction are laudable. Mr. C. J. Jaydev of the Madras Museum is also working on the finger prints of some south Indian aborigines. It is proposed to describe here the few data already published and also those collected by the present writer during his spare hours at the field. The original data are at the Dept. of Anthropology, Indian Museum, Calcutta and the present author was able to complete the identifications of the finger prints only.

Australoids

Of the Australoids some data from the Paniyans and the Adiyans could be collected. There are also some data from the Vettu Kurumas and though their ethnic position is not correctly known, they have been discussed here in view of the territorial contiguity.

The absolute figures of the finger prints of the above three groups are given in the Table XXXIII below :

Table XXXIII

Finger Prints of Paniyans, Adiyans & Vettu Kurumas.

(Abs. Nos.)

Paniyans	Left Hand I	II	III	IV	V	Right Hand I	II	III	IV	V	Total
Whorl	52	49	37	48	14	50	47	34	52	20	403
Radial Loops	2	4	1	1	2	2	4	3	1	3	23
Ulnar Loops	15	13	30	22	53	16	17	31	17	46	260
Arch	0	3	2	0	0	0	2	2	0	0	9
Total	69	69	70	71	69	68	70	70	70	69	695
Adiyans											
Whorl	13	9	8	12	6	11	13	11	14	7	104
Radial Loops	0	2	0	0	0	0	1	0	0	0	3
Ulnar Loops	6	7	11	8	14	8	3	7	5	13	82
Arch	1	2	1	0	0	1	2	2	1	0	10
Total	20	20	20	20	20	20	19	20	20	20	199
Vettu Kurumas											
Whorl	8	10	6	9	4	7	11	2	11	2	70
Radial Loops	0	0	3	0	0	0	1	0	1	0	5
Ulnar Loops	14	4	12	11	17	15	6	19	10	19	127
Arch	0	6	1	1	1	0	4	1	0	0	14
Total	22	20	22	21	22	22	22	22	22	21	216

The above data, combined irrespective of the two hands, appear as follows in the Table XXXIV.

Table XXXIV

Finger Prints of Paniyans (Pn), Adiyans (Ad) & Vettu Kurumas (Vk) (Lt. & Rt. Combined)

	Whorl			Radial Loop			Ulnar Loop			Total			Arch		
	Pn	Ad	Vk	Pn	Ad	Vk	Pn	Ad	Vk	Pn	Ad	Vk	Pn	Ad	Vk
I	102	24	15	4	0	0	31	14	29	35	14	29	0	2	0
%	74.45	60.0	34.09	2.92	—	—	22.63	35.0	65.91	25.55	35.0	65.91	—	5.0	—
II	96	22	21	8	3	1	30	10	10	38	13	11	5	4	10
%	69.06	56.41	50.0	5.76	7.69	2.38	21.58	25.64	23.81	27.34	33.33	26.19	3.60	10.26	23.81
III	71	19	8	4	0	3	61	18	31	65	18	34	4	3	2
%	50.71	47.50	18.18	2.86	—	6.82	43.57	45.0	70.45	46.43	45.0	77.27	2.86	7.5	4.55
IV	100	26	20	2	0	1	39	13	21	41	13	22	0	1	1
%	70.92	65.0	46.51	1.42	—	2.33	27.66	32.5	48.84	29.08	32.5	51.17	—	2.5	2.33
V	34	13	6	5	0	0	99	27	36	105	27	36	0	0	1
%	24.64	32.5	13.95	3.62	—	—	71.74	67.5	83.72	75.36	67.5	83.72	—	—	2.33
I-V	57.99	52.26	32.41	3.31	1.51	2.31	37.41	41.21	58.8	40.72	42.72	61.11	1.29	5.03	6.48

The four types of finger prints are therefore found in the following precentages as shown in the Table XXXV below, when all the fingers are combined together.

Table XXXV

Finger Prints of Paniyans, Adiyans & Vettu Kurumas (all fingers comb.)

		LOOPS				
	Whorl	Radial	Ulnar	Total	Arch	Total
Paniyans	403	23	260	283	9	695
%	57.99	3.31	37.41	40.72	1.29	
Adiyans	104	3	82	85	10	199
%	52.26	1.51	41.21	42.72	5.03	
Vettu Kurumas	70	5	127	132	14	216
%	32.41	2.31	58.80	61.11	6.48	

It will be seen from the above data that while the Paniyans and the Adiyans agree with one another in respect of finger prints, the Vettu Kurumas differ from the above two. The Paniyans have a very low frequency of Arch, while between the Loops and Whorls, the latter predominate over the former. Among the Adiyans the same rule is seen to follow in the case of Loops and Whorls ; the frequency of Arch being higher than that of the Paniyans and the Adiyans thus stand closer to the Vettu Kurumas in this respect. The Vettu Kurumas differ from both the Paniyans and the Adiyans in the reverse order of the Loops and Whorls—the Loops predominating over the Whorls in a ratio much higher than those found in the case of the other two peoples.

Thus the finger print data also support the conclusions of blood groups. In blood groups too, it was found that while the Adiyans and the Paniyans agreed with one another in having high frequency of A, the Vettu Kurumas were differentiated from both of them in having a high element of B.

The present writer is not aware of any other published data on the finger prints of the Australoids from India. Osman Hill (1941) has published finger print data of 3 Veddas from his post-mortem studies. His data are as follows :

	Loops			
Whorls	Radial	Ulnar	Arch	Total
10	18	0	2	30

The very high frequency of the Radial Loops and the complete absence of the Ulnar Loops are noteworthy features although nothing definite can be deduced from such small data. The blood groups and the finger prints of the few existing Veddas of Ceylon should be examined, whatever they are worth for.

Negritos

Among the Negritos, finger prints of 15 Andamanese of Great Andaman were collected and the data are as follows :

Table XXXVI

Finger Prints of the Andamanese (Abs. Nos.)

	Lt. Hand					Rt. Hand					
	I	II	III	IV	V	I	II	III	IV	V	Total
Whorl	7	4	1	7	2	4	2	1	5	2	35
Radial	0	1	0	0	0	0	2	0	0	0	3
Ulnar	8	10	14	8	13	11	10	14	10	13	111
Arch	0	0	0	0	0	0	1	0	0	0	1
Total	15	15	15	15	15	15	15	15	15	15	150

The above data, combined together, appear as follows :

Table XXXVII

Finger Prints of the Andamanese (Lt. + Rt.)

Finger	Whorl	LOOPS			Arch
		Radial	Ulnar	Total	
I	11	0	19	19	0
%	36.67	..	63.33	63.33	..
II	6	3	20	23	1
%	20.0	10.0	66.67	76.67	3.33
III	2	0	28	28	0
%	6.67	..	93.33	93.33	..
IV	12	0	18	18	0
%	40.0	..	60.0	60.0	..
V	4	0	26	26	0
%	13.33	..	86.67	86.67	..
I-V	23.33	2.0	74.0	76.0	0.67

The four types of finger prints now appear among the Andamanese in the following manner :

	Whorl	Radial	Ulnar	Total Loops	Arch	Total
	35	3	111	114	1	150
%	23.33	2.0	74.0	76.0	0.67	

The Andamanese have the predominating frequency of Loops while the frequency of Arch is almost negligible. The present Andamanese population is highly mixed and the single instance of Arch in the II finger of right hand may be extraneous in origin.

Australoid-Negrito Affinities

It has already been pointed out that the Australoids have a higher frequency of Whorls over Loops while the Andamanese possess just its contrary—namely, Loops over Whorls. In respect of Arch as well, it appears that the Negritos possess no Arch at all whereas the Australoids are likely to show a small frequency of this character. That the Negritos of Eastern Asia do not possess any Arch at all will be apparent from the following comparative data of the Semang and the Aeta collected by Schebesta (1952). Data from the African Negritos are also compared (Table XXXVIII).

TABLE XXXVIII

Comparative Finger Print Data of Asiatic and African Negritos (in %)

	Peoples	Whorls	L O O P S			Arch	Author
			Radial	Ulnar	Total		
Asia	Andamanese ..	23.33	2.0	74.0	76.0	0.67	Sarkar
Asia	Semang ..	60.3	1.1	38.6	49.7	0	Schebesta
Asia	Aeta	54.8	2.6	41.6	44.2	1.0	„
Africa	Pygmies (Ituri) ..	19.6	2.7	61.3	64.0	16.2	Dankmeijer
Africa	„ (Cen. Africa)	16.31	1.54	65.77	67.31	16.38	Valsik
Africa	Bushman ..	15.1	3.7	64.8	68.5	16.4	Weninger
Africa	Hottentot ..	18.6	4.1	72.2	76.3	5.1	Fleischhacker

The Semang does not show any Arch at all while the Aeta has only 1% of it. The order of the Loops and Whorls are, however, changed otherwise than the Andamanese, Whorls being greater than the Loops. The Andamanese are not a true sample of the Negritos and their finger print distribution, just as the blood groups, should not be taken as true of the Negritos of the Andaman Islands. We have to reserve our opinion till a finger print collection of the Onges or the Jarawas is forthcoming.

At the same time the difference in the finger prints between the African and the Asiatic Negritos is striking. The African Negritos stand aloof by virtue of a very high frequency of Arch and their dominant nature is Loops as opposed to the Whorls of the Asiatic ones. If the Semang is considered as a true representative of the Asiatic Negritos, we find that they agree with the Australoids in having more Whorls than Loops, roughly in the proportion of 60: 40, and the two groups thus agree with one another not only in having the high frequency of the common blood group A but also in their finger print character. Further data are however, required to assess truly the Australoid-Negrito affinities.

Mundari and Oraon Finger Prints

Verma (1952) has provided some valuable finger print data from the Oraons of Ranchi, which are given in Tables XXXIX and XL. He has also cited the unpublished data of Biswas on the Santals, which are included in Table XXXIX.

TABLE XXXIX

Finger Prints of Oraons (after Verma)

	Left Hand					Right Hand					Total	%	Santals %
	I	II	III	IV	V	I	II	III	IV	V			
Whorl ..	68	68	51	92	38	82	59	45	94	50	647	36.6	38.8
Radial Loop ..	14	21	6	2	6	13	21	3	1	3	90	5.1	57.2
Ulnar „ ..	88	66	106	73	126	77	74	115	78	121	924	52.2	
Arch ..	7	23	14	10	7	5	23	13	4	3	109	6.1	4.0
Total ..	177	178	177	177	177	177	177	176	177	177	1770		

TABLE XL

Oraon Finger Prints, I—V Fingers (Lt. + Rt.) (after Verma)

Finger	LOOPS Whorl %	Radial %	Ulnar %	Total %	Arch %
I	42.37	7.62	46.61	54.23	3.39
II	35.87	11.86	39.54	51.40	12.98
III	27.12	2.54	62.43	64.97	7.62
IV	52.54	0.84	42.65	43.49	3.95
V	24.86	2.54	69.78	72.32	2.82

A comparison of the Tables XXXV and XXXIX will show striking difference in finger prints between the Australoids and the other groups. The Paniyans and the Adiyans show a higher frequency of Whorls than those of the Oraons and the Santals while among the latter groups, Loops occur in a frequency higher than those of the former groups. In Arch, the Paniyans appear to stand apart from all the other groups while the others, almost agree with one another in respect of this character. The Vettu Kurumas agree with the Oraons and the Santals in all characters excepting the Radial Loops.

It is too premature to emphasize the above differences on such small data but that studies on the finger prints of other aboriginal groups of this country may lead to fruitful results will be evident from our previous discussions.

Ape-line (Affenfurche or Vierfingerfurche)

The ape-line, known as Affenfurche or Vierfingerfurche in German, has also attained certain prominence in racial studies and in view of its association with certain defects, such as mongolian imbecility and criminality, it has attained hereditary importance as well.

In apes, the heart line (*plica flexoria distalis*) runs transversely across the middle of the palm in a continuous unbroken line from its ulnar end of origin to the radial side. This typical form persists in certain human hands and is known as the ape-line. The head line (*plica flexoria proximalis*) is absent in such cases. In certain hands the fusion of the head and heart lines occurs in various ways which are known

as transitional (Uebergangsform) forms. Crookshank (1924) drew particular attention to the presence of the typical ape-line in the hands of all Buddha images and the Mongols.

Frequency

The majority of the published data is from Germany and Switzerland. Rittmeister (1937) found the frequency of the ape-line among 230 Swiss to be 1.03%. In 826 Dutch criminals he found the frequency of the ape-line and the transition line, together to be 5.7%. Hanhart (1936) found it to be 0.95% for the Swiss but he did not take into account the transition line. Eugen Fischer (1949) in his recent review of the problem, has placed the frequency of the ape-line to be about 3% while the same rises to 6-13% in criminals, mental and constitutional defectives. Fischer's data compiled by him from various sources are given below :

People	no.	Ape-line	Transition line
Eskimo	74	5.4 %	1.4 %
Guayaki Indian	41	7.1 %	16.7 %
Basua (Male)	191	L.H. 16.2 % R.H. 17.8 %	
" (female)	104	L.H. 17.3 % R.H. 18.2 %	
Chinese	100	13.0 %	2.0 %

Frequency in Indian Aborigines

Before going into the details of the frequency of the above character in this country, it is worthwhile describing a method of study devised by the present author which, in view of its genetic implications, facilitates a detailed description of this character. Taking A for the ape-line and U for the transition line and o for their absence there can be the following five combinations : AA, AU, Ao, UU, and oU. If the symbol on the left is meant for that of the left hand and that on the right for the right hand, then there will be the following 8 combinations for the two hands :

oA, Ao, AA, AU, UU, UA, Uo and oU

These symbols are not only of handy use but also aim at a correct morphological description of the two lines to avoid the

already existing anomalies. Previous workers did not realise the value of the transition line and as such some of the earlier data are rather questionable.

The Indian data, classified on the above manner, are as follows :

Table XLI
Frequency of Ape-line among Indian Aborigines

Peoples	no.	oA	Ao	AA	AU	UA	UU	Uo	oU	Total
Abors	229	16	3	5	6	8	25	17	21	101
Birjias	88	8	4	6	0	1	10	8	7	44
Adiyans	35	2	1	0	0	0	3	5	5	16
Paniyans	115	8	3	2	1	1	16	6	15	52

Thus both the ape-line and the transition line occur in the frequency of 44.1% among the Abors of Assam, 50% among the Birjias of Palamau, Bihar, and 45.71% and 45.21% among the Adiyans and the Paniyans respectively of Wynad, Malabar. Chatterjee and Basu (1954) in a brief note on the ape-line of the Onges of the Little Andaman Island have found in a collection of 47 palmar prints, 8 cases of ape-line and 23 instances of transition line, which works up to 17.02% and 48.93% respectively. This agrees fairly with the frequencies of the data presented in Table XLI. It is too premature to comment

TABLE XLII
Frequencies of the Ape-line and Transition line

Peoples	no.	Ape-line	Transition line	Total
Adiyans	35	8.56%	37.15%	45.71%
Paniyans	115	13.0 %	32.21%	45.21%
Abors	229	16.59%	27.51%	44.10%
Birjias	88	21.59%	28.41%	50.00%
Onges	47	17.02%	48.93%	65.95%

on the racial issue from the above data although a few points are worth mentioning. The high frequency of the Onges and the Birjias may be due to the high amount of inbreeding among these peoples. In respect of the other three groups, of which the Adiyans and the Paniyans have been already discussed under the Australoids, and the Abors who are Mongoloids, there appear to be at present no difference in this character of the palm. Further researches on this line are however, necessary to confirm the above view.

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APPENDIX I

Disposal of the Dead at Harappa*

In his recent paper on 'Vedic Funeral Customs and Indus Valley Culture' Dr. B. N. Datta[1] identifies the people of the first stratum of the cemetery at Harappa practising jar burials with the Vedic Aryans. The detailed report of the skeletal remains of Harappa has not yet been published and it is too early to draw any conclusion on them. Regarding the antiquity of the jar burial stratum of Harappa, Sir John Marshall is of opinion that it belongs to a much later age but the archaeological evidence has not yet been fully cleared up.

The present writer had the privilege to spend one full excavation season at Harappa in 1930-31 and to examine all the human remains found at Harappa till then.

The cemetery at Harappa has been dug up to three distinct strata. The first or the topmost stratum of the cemetery contains jar burials ; the second complete burials, while the third or the lowest has yielded animal bones only. Almost all the burial jars contained fractional burials and before the skeletons were put into the jars they were undoubtedly exposed, for the mouth of the jars was found to be too narrow to allow an entire human body to get through it. That the dead bodies were exposed before they were put into the jars is further apparent from the fact that the bones of more than one individual have often been found in the same jar. The presence of these bones of a second individual appears to be unintentional. The dead bodies were probably exposed in a particular spot, wherefrom in the process of transferring them into the jars, bones of more than one individual might have stuck together. These could be somewhat differentiated from the jars where remains of two individuals were intentionally buried and in the majority of cases they contained children's skeletons ; it might be that the adult skeletons found along with them were those of their parents. A large number of jars has been found without any

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* Modified from the original published in *Science and Culture,* II, 1936.

1. *Man in India,* 16, 1936.

bone whatsoever, probably the few pieces of bones disintegrated completely. Lastly, that the dead bodies were first exposed to the birds and animals is also evident from the fact that not a single complete skeleton has been found in any jar. There were only two jar burials with a few fragments of charred bones. From the large number of jars found with unburnt bones it does not appear that the people of the first stratum practised cremation. The long bones were usually found to hedge round the skull which was placed at the centre. The dead bodies of children were always found in embryonic position and ten such burials were excavated. The babies appeared to be below two years of age. There is, therefore, no doubt that the people of the first stratum practised fractional burials after the dead bodies were exposed on the ground or a common platform.

The second stratum has yielded complete burials. Here the dead was laid either on the spine or on one side and in a large number of cases was accompanied by funeral pottery. That some animal bones were intentionally placed along with the dead body has been distinctly proved by the discovery of a skeleton, excavated by the present writer, accompanied on the side by the badly severed skeleton of a goat or sheep (Pl. LII, *a*, Vats,* 1941). A part of the animal's rib was placed in the crossed hands of the dead man. In another case a piece of animal bone was found on one of the earthen dishes placed alongside the dead. Besides these two cases, most of the open burials which were lifted in the earlier seasons were accompanied by some sort of animal bones. It appears that there was no fixed method of orientation of the dead body ; it has been found with the head in almost all directions. It was previously held that no skeleton was found with the head to the west and therefore, any skeleton, which was discovered during the excavations with the head to the west, was believed to belong to the muhammadans and reburied with all courtesy to the dead. The discovery of the skeleton along with the sacrificed animal by its side and its head to the west, accompanied by a group of funeral pottery of the Indus Valley type near the feet, in February 1931, finally settled the question. Since then, the present writer also removed two skeletons, which had their heads to the west. One of the above skeleton, which was unfortunately reburied, appeared to the author to be a case of floor burial and it took

* Vats, M.S. Excavations from Harappa, Vols. I & II, Delhi, 1941.

him four complete days to expose the skeleton. It was found in trench IV of Mound F below the second stratum of building layers and a terracotta ringstand, usually used for keeping store jars on the floor of the house, was lying about a foot above the head of the skeleton. The head lay detached from the skeleton at a distance of about six inches from the body. A second lot of human remains was also found in the same trench, which however, forms a part of the Harappa collection. The latter had no skull along with it ; only some bones of the upper extremity and a right tibia were found. The first skeleton thus supports the contention of Sir John Marshall that floor burial was in vogue in the Indus Valley. The stray bones, mentioned in the second lot and found in Trench IV, Mound F, among the building sites, might have been carried by birds and animals when the dead bodies were left exposed and they should not be always treated as fractional burials.

To come back to the cemetery again. Towards the fall of the 1930-31 season the cemetery was extended to the north. Here the first stratum yielded the same type of jar burials but the second stratum, which towards the southern side had been yielding complete burials, opened out a number of fractional burials only. The type of pottery accompanying the bones was, however, similar to that of the southern end. It appeared, that at this period, there was some sort of disturbance, which affected the burial customs of the second stratum people. The northern extension was found to cease at this end as the building walls were exposed and the total area of this extension was probably less than one-fourth the area of the main cemetery. The people of the first stratum, as can be guessed from the skeletal remains and the burial jars, were much larger in number than that of the second stratum. The results of excavation at this end suggests, in the present writer's opinion, a period of clash between the two peoples and it appears that the people of the first stratum dominated over the people of the second stratum. The latter seems to have left their last trace at this corner of the cemetery and they had probably, to leave the cemetery to the people of the first stratum here. In this extension the number of funerary pottery are fewer than those found in the main cemetery. Remains of only five individuals have been identified from the skeletal remains and they were very meagrely represented by the bones. They appear to be the remnants of the individuals killed in their struggle with the first stratum people although the fractional nature of the burials is very

much striking. It appears rather improbable that the first stratum people prevailed upon those of the second stratum, being their conquerors, to adopt the fractional burial. It may be that these individuals were not so carefully buried as the others in the main cemetery, because if they were really engaged in a warfare they could hardly pay any attention to the killed.

It thus follows that the people of the second stratum did not practise any exposure before burial and unlike the people of the first stratum, who used to make fractional burials, they practised complete burials. The methods of disposal of the dead of the two peoples are therefore, entirely different. The people of the second stratum who appear to be contemporary with the late Indus Valley period, therefore did not practise cremation. Sir John Marshall is however of opinion that cremation was the likely method of disposal of the dead in the Indus Valley during chalcolithic times. The evidences of post-cremation burials are meagre and at Harappa at least, complete burials have been found in the majority, which seems to be the prevailing mode of burial in the Indus Valley.

That there was a clash between the peoples of the first and the second strata also appears to be corroborated by the human remains from G site. The presence of a large number of human and animal bones in a refuse manner, which cannot in any way be called a burial, also supports the above contention. It seems that the dead bodies were thrown in a dump at this spot after the warfare. Further, the racial types represented in some parts of the G site and in the second stratum of the cemetery appear to be closely related.

At present we cannot say anything definite regarding the people of the first stratum. As has been pointed out by Dr. B. S. Guha*, they indicate the presence of a different race and possibly a different culture. Their cultural remains may be dug up some day.

Coming to Dr. Datta's identification of the above people with the Vedic Aryans the first difficulty lies in the fact that even if we consider jar burials as similar to the urn burials of *Griha Sutra* the custom of exposing the dead bodies to the wild animals and birds before the skeletons were put in the jars

*Guha, B.S. Racial Affinities of the Peoples of India. Census of India, 1931, Delhi, 1935.

has not been known to be in vogue among the Vedic Aryans. Further, as can be understood from the descriptions of the jar burials given above, the remains of burnt skeletons are exceedingly rare, although Dr. Datta speaks of it as if it was a general practice. It is too premature to enter into the controversy of the racial types before the Harappa and the second Mohenjodaro reports (by Dr. Mackay)* are published and in view of the facts stated above regarding the disposal of the dead at Harappa there cannot be any justification for Dr. Datta's contention that the jar burial peoples of Harappa were identical with the Vedic Aryans.

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* This has been published in 1938.

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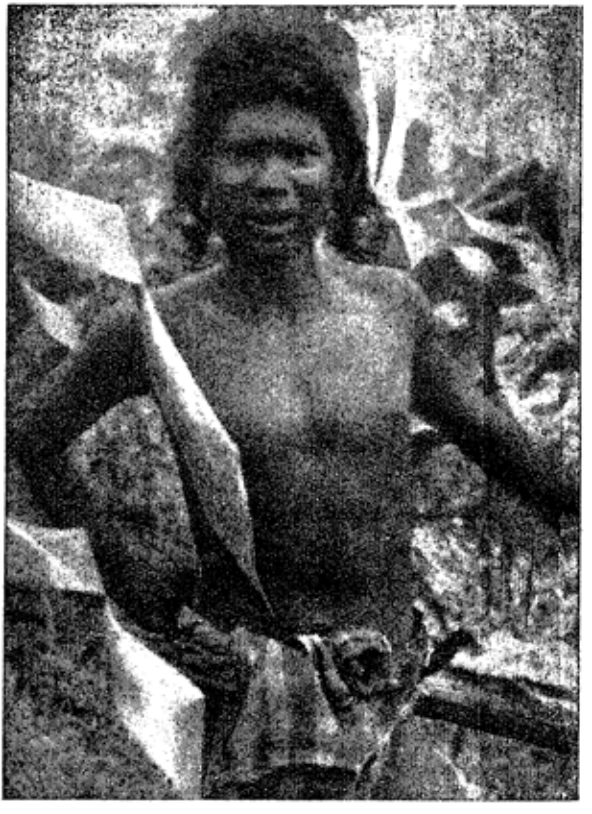


An existing Vedda of Ceylon

a

a—Front view of a male Mālé from Rajmahal Hills.

b

b—Profile view of the same.

c—Front view of a female Mälé from Rajmahal Hills.

c

b—Profile view of the same.

d

Front view of a Mālé boy from Rajmahal Hills.

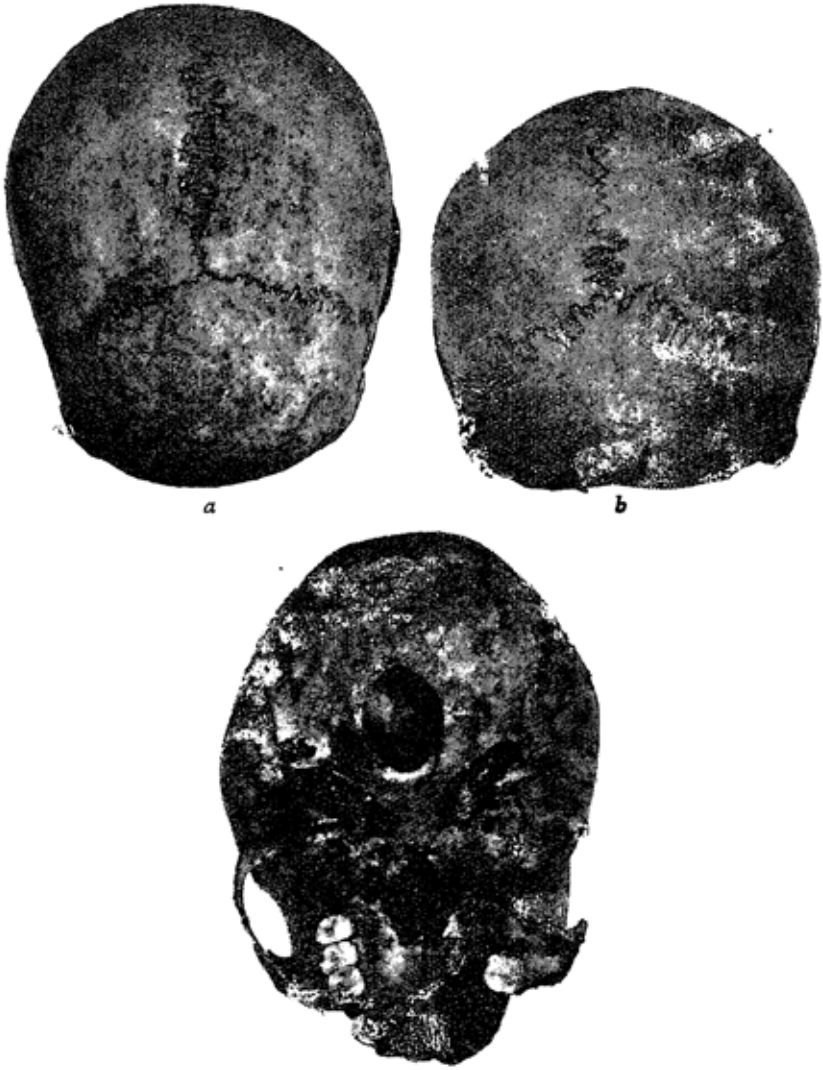
a

Profile view of the same.

b

c—Front view of a Malé (Plains Village).

d—Front view of an existing Vedda.



a—c—Different views of a Mālé female skull from *Gama Pahae*.

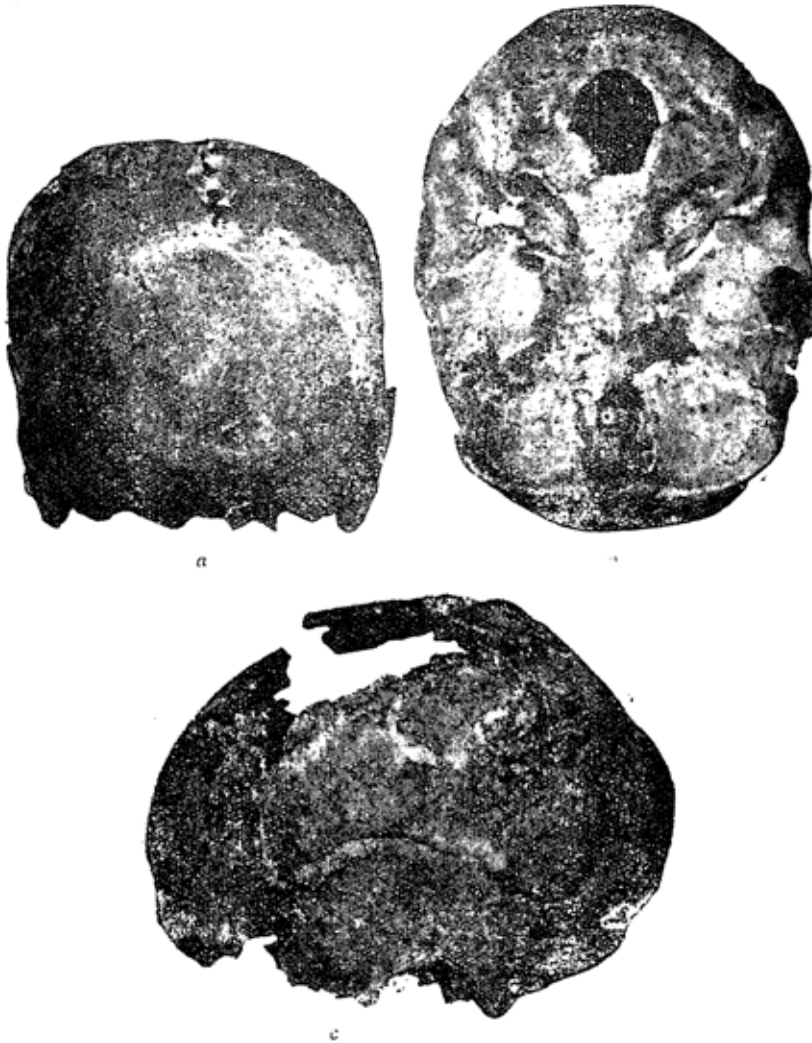
a—Norma verticalis × about $\frac{3}{4}$

b—Norma occipitalis × $\frac{1}{2}$.

c— „ basilaris × $\frac{1}{2}$.

d

d—Norma lateralis × ½.
e— „ facialis × ½.



a—*c*—Different views of a Malé male skull (about ½ nat. size) from Guma P har

a—Norma occipitalis.
b— „ basilaris.
c— „ lateralis.

V

d

d—*e*—Lower jaw (about ⅓ nat. size) from *Guma Pahar*. . .

e

a *b*

a—Scapula (about $\frac{5}{12}$ nat. size) from *Guma Pahar* dorsal view.
b—Scapula (about $\frac{3}{7}$ nat. size) from *Guma Pahar* ventral view.

c *d* *e*

c—Lt. Humerus (about $\frac{1}{4}$ nat. size) from *Danowar*.
d—Rt. Humerus (about $\frac{1}{8}$ nat. size) from *Danowar*.
e—Lt. Humerus (about $\frac{1}{4}$ nat. size) from *Guma Pahar*.

f *g* *h*

f—*h*—Ventral views of the humerii (c, d, e).

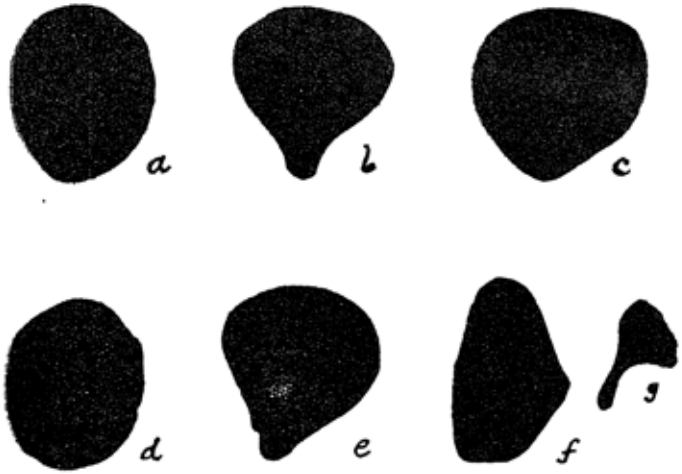
i

j

k

l

i—Rt. Ulna (about $\frac{1}{4}$ nat. size) from *Danowar*.
j—Rt. Ulna (about $\frac{3}{7}$ nat. size) from *Guma Pahar*.
k—Lt. Ulna (about $\frac{3}{11}$ nat. size) from *Guma Pahar*.
l—Rt. Radius (about $\frac{3}{7}$ nat. size) from *Guma Pahar*.



a—*g*—Cross Sections of the Long bones from *Danowar*.
Rt. Femur : *a*—proximal ; *b*—medial, *c*—distal
Lt. Femur : *d*—proximal ;
e—medial ; *f*—cross section through the tibia ;
g—cross section through the fibula.

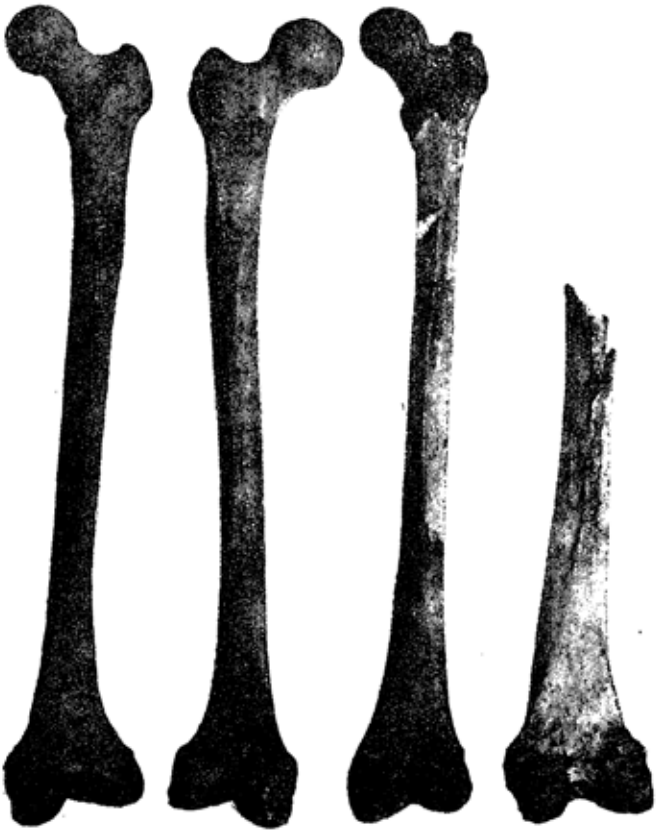
h

h—Pelvic Girdle (about $\frac{3}{5}$ nat. size) from Guma Pahar.

i *j*

i—j—Dorsal and Ventral views of Lt. Astragalus (about nat. size) from Guma Pahar.

A—Rt. and Lt. Femora (about $\frac{2}{3}$ nat. size) from *Guma Pahar.*
B—Rt. Femur (about $\frac{1}{3}$ nat. size) from *Guma Pahar.*
C—Rt. Femur (about $\frac{1}{3}$ nat. size) from *Guma Pahar.*



a—*c*—Ventral views of the femora, AA, B, C.

A A B C d e

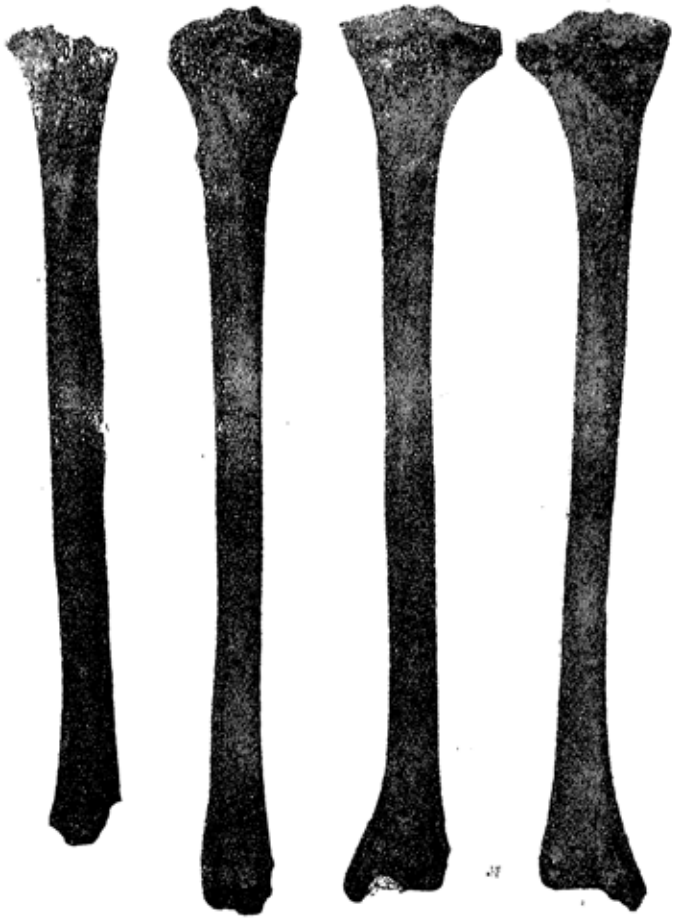
A—Rt. and Lt. Tibiae (about $\frac{1}{8}$ nat. size) from *Guma Pahar*

B—Lt. Tibia (about $\frac{1}{3}$ nat. size) from *Guma Pahar*

C—Rt. Tibia (about $\frac{1}{8}$ nat. size from *Danowar*

d—shaft fragment of fibula (about $\frac{1}{3}$ nat. size from *Guma Pahar*

e—shaft fragment of fibula (about $\frac{2}{5}$ nat. size) from *Danowar*



a a b c

a—c—Ventral views of the tibiae, AA, B, C.

a

a—*b*—Birjias from Palamau District.

b

c—Front view of a Santal from Santal Pargs.

c

d—Profile view of the same.

d

a—Santal boy from Santal Pargs.

a

b—Santal from Santal Pargs.

b

c

c—Oraon mother with child from Ranchi.